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THE AMERICAN GAS LIGHT JOURNAL

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BRIEFLY TOLD.

DEATH OF MR. JAMES MCILHENNY.—Our current item columns carry short mention of the death of Mr. James McIlhenny, second son of Mr. John McIlhenny, of the firm of Helme & McIlhenny, of Philadelphia. Since the item was written we have received some further particulars respecting the untimely and peculiar accident that caused his death. Mr. James McIlhenny had for several years been prominently identified with the West American Fruit Company, the headquarters of which are in Redlands, Cal. Last month he decided upon taking a sea trip, partly for recreation and partly for the benefit of his health, and determined to "rough it" in a lumber schooner, bound from San Pedro (the shipping port of Los Angeles, Cal.), to Seattle, Wash. Making the voyage, some bad weather was encountered, during the continuance of which Mr. McIlhenny was thrown from his sleeping berth with violence sufficient to bring about injuries that resulted in instant death. His remains were returned to Germantown, Pa., where they were placed in the McIlhenny plot, the day of August 17th.

PROPORTIONAL METERS.—On page 365 of the JOURNAL for to-day will be found a contribution to the proceedings of the 9th annual meeting of the Pacific Coast Gas Association, the fountain head of which contribution was in Mr. John A. Britton, the Association's worthy, capable and honored President. The particular contribution made by Mr. Britton in this instance to the proceedings of the meeting to which we wish to direct attention is under the title of "Narration of Experiences at Oakland," and it will be found at the closing of Editor Gregory's batch of "Experiences." Mr. Britton elected to recite his experiences over the matter of the use, in his Oakland gas works, of a proportional gas meter for measuring gas. The gas plant at Oakland has gone through many vicissitudes since 1873, when the Eastland dynasty was in military control and sway, so it is fair to presume that its station meter of 1874 was not adequate to the demands exacted from it in 1900, always remembering that the output of the Oakland Company in the 16 years had increased something like 200 per cent. over that for which the 1874 meter had been constructed to care. Well, the old meter "wore out," and the Oakland folks put in a proportional one, mainly, as far as we may reflect from President Britton's statement, on account of its cheapness, from space occupying and ultimate cash payment points of view. Such practice is not a bit like Mr. Britton's personal ways, for the latter are liberal to the best degree, so we will have to take it for granted that his people, in ordering the purchase of the "proportional," forgot the pound while they were looking at the penny. There are meters of weight and there are measurers of time; but we are quite certain that Mr. Britton, if acting for himself on personal account, would not have his coal supply weighed on the scales of an apothecary, nor have his time marked by a Waterbury watch. Yet he seemingly advocates the use of a proportional valve to estimate, no, to mark actually, the quantity of a material, of quite an elusive nature, that should be passing through the proper diametered orifice. The fact of the matter is that the proportional meter, as a measurer of gas under the conditions now existing in populous centers where artificial gas is supplied, is of no value whatever. We quite agree with Mr. Papst, of San Francisco, who, in discussing

Mr. Britton's words on the proportional meter and its advantages, said, "I do not believe the meter ever can be made to register correctly." We know that, where it has been tried this side of the Ohio river, on artificial gas, it has not even shown as good results in its sphere as those on the average obtained by the Jones' jet photometer. That is, in cases where gas men were not trying to fool themselves. The present proportional meter will not do in an artificial gas works, the proprietors of which are anxious to be reasonably sure of that which they are doing. The day of the station meter is still on the calendar.

NOTES.—Superintendent Burkhart is our authority for the statement that the Everett (Wash.) works will be in operation by October 1st.——The McLean syndicate, of Dubuque, Ia., have virtually acquired the gas and electric lighting plants of Cedar Falls, Ia.——Mr. Milo H. Dole has been appointed Manager of the Adrian (Mich.) Gas Company's properties, vice Mr. C. H. Raynor, resigned. As heretofore stated in the JOURNAL, the Adrian property has changed hands.——The Toledo (O.) Gas Light and Coke Company has acquired all the city's interest in the latter's pipe system for the distribution of natural gas. The contract is to run for a term of years.

Length of the Working Day in America.

The English *Journal of Gas Lighting* had this to say recently respecting the matter outlined in the heading: A very interesting discussion on the perennial topic of the proper hours of the adult mechanic's day was given in the July number of the *Engineering Magazine*. The question arose out of the strike of the Trade Union mechanics—or "machinists," to give them their proper classification—for a 9-hour day without reduction of wages. The associated employers were willing at first to grant a 54-hour week; but matters grew complicated, and a strike of Union men all over the country was precipitated. This was a keen disappointment to those who had trusted in association and conference to avert labor troubles. The employers and the men's representatives were actually in treaty, when the outbreak came at the command of the Union. It is interesting to note here that the reason assigned for the strike is a luminous commentary upon the state of American industrial opinion. Over and over again, British workmen have been taunted with the longer hours contentedly accepted by their rivals the Continental and American mechanics; and now it appears that the American wants to get rid of this difference, and work the same time as his British brother. It was the masters who put the day at 10 hours not the men. One American employer after another declares that if his men will work for only nine hours a day, his foreign trade will be gone. Not much faith in superior American shop methods here! Mr. Walter Wood, of Philadelphia, puts the matter upon its natural basis when he remarks that the question is really how many hours men can comfortably work. Whatever this period may be, there will always be in the world earnest and active men who will want to work that number of hours; and it is they who will get the best of the trade in the long run. Coming down to particulars, Mr. Wood said he should feel it a mistake if the hearty well-fed men of the United States could not do their 10-hour day and put in their pockets the money coming from it. Englishmen only work 9 hours. If Americans go on working 10 hours a day, they must maintain a pull on the Englishman. Think what an enormous difference the extra hour's output must make for the whole of the strenuous population of the United States!

It is very remarkable how the 8-hour day agitation, which 2 or 3 years ago was so lively in England that one could scarcely pick up a newspaper or magazine without seeing some mention of it, has died out. Many shops where it was tried have given it up and returned to the old working hours. Mr. Walter Wood's rule really governs the industrial world; and nowadays, with so much work done by machines, it is absurd to pretend that it hurts any man to stand and watch a tool for 9½ hours. Nobody can truthfully say that the British workman works a slavish number of hours. Indeed, he is a man to be greatly envied in this regard. Few of the working people who rank as his social superiors, the professional men and others, have such short hours. Many of this order of the community never know when their work is done, and are thankful if it allows them to sleep a reasonable number of hours at night. The great question of the future for the industrial world is not the nominal length of the machinist's and mechanic's day, but the spirit and the rate at which he works in it. Competent and impartial foreigners aver that the British workman is much slacker than the American. He does not produce so much while he works, and he plays more. A good deal of this laziness is obviously a fruit of Trade Unionism, with its levelling down of the performance of all the men in a shop or on a building to the ability of the worst, and its teaching that the more work one man does the less remains for others. It is also encouraged by Trade Union aversion to machines. The strike of moulders at Hull is a good example of how men are ruined and made worthless in this way. The moulders first struck against the introduction of certain moulding machines; and when they found themselves beaten at this, they made the usual claim that only full-wage mechanics should work the machines. Where this was conceded, it was found that the machines did not turn out anything like their normal production, and had a tendency to break down. Consequently, the machines are now intrusted to laady laborers, and the moulders are out of it,

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.—Continued from Page 329.]

PROCEEDINGS, NINTH ANNUAL MEETING OF THE PACIFIC COAST GAS ASSOCIATION.

HELD IN THE OFFICES OF THE SAN FEANCISCO GAS AND ELECTRIC COMPANY, JULY 16, 17 AND 18, 1901.

SECOND DAY, JULY 17, MORNING SESSION.

THE EXPERIENCE DEPARTMENT.

The President then called upon Mr. O. M. Gregory, of San Jose, Cal., Editor of the Experience Department, who presented the following budget:

Mr. President and Gentlemen of the Pacific Coast Gas Association: My "experience" with the members of this Association tells me that they do not think I need these short papers till the last minute. High officials in the gas business, even disciplinarians whose executive ability brings them to the top rung of the Pacific Coast Gas Association ladder, failed to send their experiences in time for one to get a comprehensive view of the work of correction, comment and compilation in time to do justice thereto. There is no extra charge for the above experience. It is given for the benefit of my successor in this department.

No. 1—*Coal Shed.*—I have another, the relation of which may save someone trouble and expense in storing coal. The San Jose Light and Power Company has a coal shed of 2,000 tons capacity. It is 120 feet long, 42 feet wide and 20 feet high to the floor of the runway, from which the coal is dumped after leaving the elevator. The inside studding, which supports the timbers of the coal shed proper, is 2 inches by 14 inches by 20 feet long (Oregon pine), set 5 feet apart, and drawn in 3 feet at the top, as shown in the accompanying plan.

Some years ago, probably in 1892 or 1893, we filled the shed full, and proved at the same time that the 2-inch by 14-inch studding was not strong enough to hold that weight of coal. Many of them sprung out in the middle and split. When the coal again got low, we hauled them into place with chain blocks, and doubled them, by spiking another 2-inch by 14-inch on each of the broken ones.

Experience seems to teach that the studding of a coal shed of considerable height, unless made of very large timber, should be taken in at the top, about 1 foot for every 4 contained in its height.

Discussion.

Mr. Jones—The rotting of posts at the parts next the soil has been a great difficulty. In the East we used the spent lime from the purifiers for filling post holes. That is a good preserver of timber. Out here we have used oil tar asphaltum for coating.

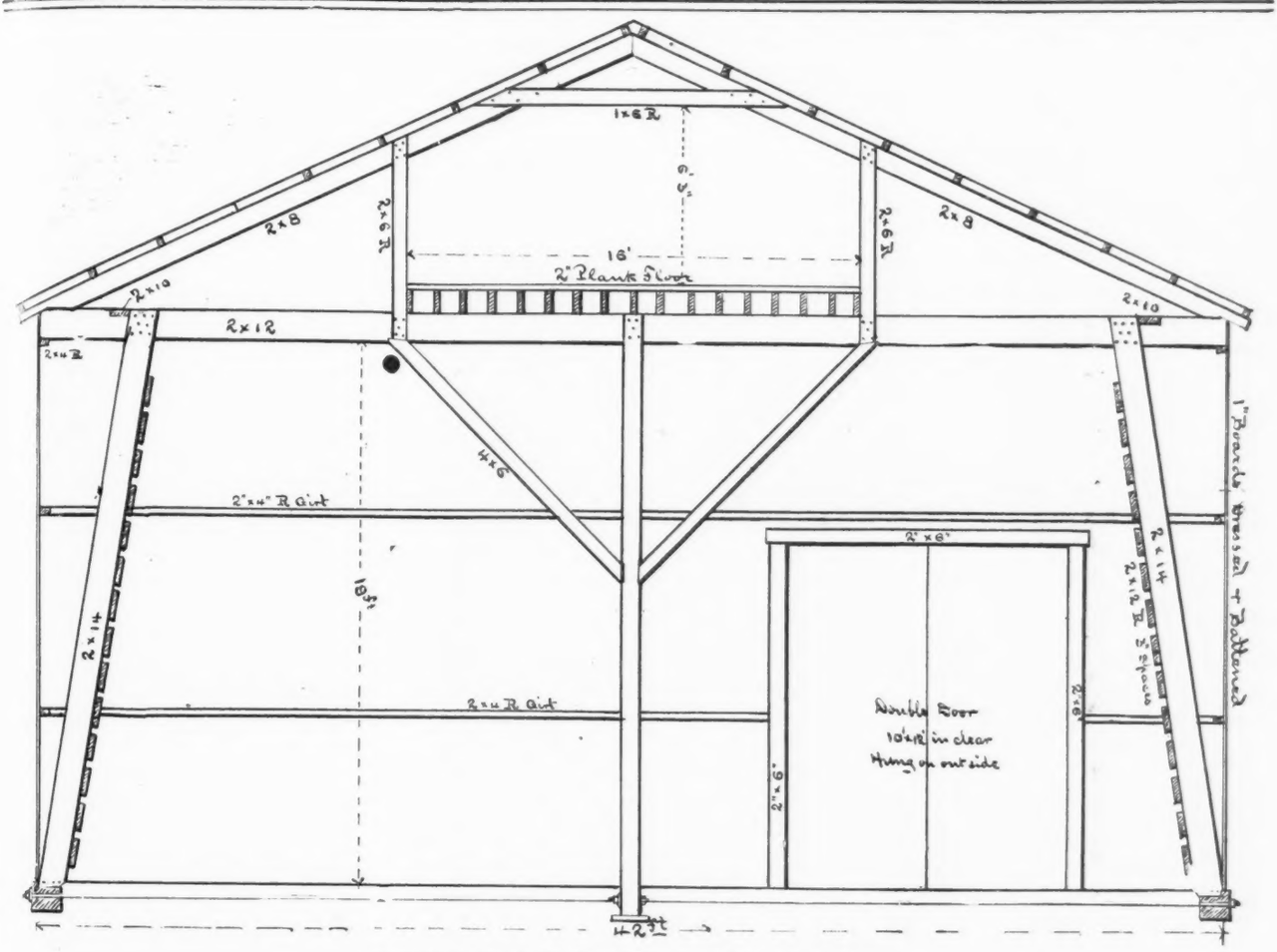
Mr. Parker—We had an experience of that kind with our own coal shed, holding about 1,000 tons. To overcome the difficulty of the posts rotting off, we cut them and placed them upon a flat rock leaving them like the legs of a table. The stay rods went through a little less than midway of the top, with stiffening braces put underneath the rods.

Mr. Britton—I consider that the amount of money ordinarily invested in coal sheds is not warranted by the conditions in California. Do you think it is necessary to build coal sheds, Mr. Jones, under our conditions here?

Mr. Jones—I do not. I would like to say that I do not believe in building brick purifying houses either, in this climate.

Mr. Britton—I think it would pay the gas companies here to demolish their sheds rather than to maintain them.

No. 2—*Value of Steam Plant at Gas Works.*—The gentleman says: "I find only one item of any importance, and it is not to my credit to give it, yet it is an experience, and here it is. In November last we had our first severe cold snap of the season. About 11 o'clock, P.M., I was called up by 'phone with the statement that the gas was blowing out from the tar extractor. I hurried to the works, about a mile from my home, and found no gas passing to the holder, so started on the hunt. First, lighting the lids of the retorts, I examined the condenser pipes, the center seal and drip pipes. In the latter I found quite a deposit of tar and water. I cleaned it out ond closed the retort lids, but the blow still continued. On further examination I found the inlet pipes to the washers filled and frozen. Not having steam available I adopted such means as I could, and about 7 o'clock, A.M., got it clear. I then charged three retorts and thought my troubles were over; but not so. In about 20 minutes gas blew again from the tap extractor and purifiers. The holder had grounded at 4 P.M., and the street valve had been shut off. Being quite exhausted, I sent for a plumber and helper and went home for breakfast and sleep. They worked until noon, and



Experience No. 1.—Coal Shed for San Jose Light and Power Company.

succeeded in clearing everything to the station meter, which we turned off. I commenced charging at 1 o'clock and raised the holder about one sheet. The holder grounded once more, but as the stores close at 7 o'clock, I did not turn the gas off the street again but gave them what I could make. At 8 o'clock we got it started on the rise, and from that time it was 'O.K.' It did not take me long to install a steam boiler, which helped out the balance of the winter. I have been in charge of our plant for well over 15 years and that was the first serious trouble I had. I never had a stopped standpipe nor trouble from naphthaline, nor any of the bother that so often comes to gas men."

I am glad we received the above "Experience." It shows the necessity of having a little steam at a coal gas works. The sender said it was not to his credit. I think he felt that way because he "grounded" a couple of times, but we cannot blame a captain for getting in a storm. We all have words of praise for his fortitude while in, and of congratulation when he sails gracefully out of it.

Discussion.

Mr. Jones—I think that experience is a good argument for bye-passing every piece of apparatus. I do not think a gasholder should ever be permitted to grouud unless there are plenty of others full of gas.

Mr. Clements—I once operated a plant where no steam was to be derived from any source. On one occasion we had a serious stoppage in our pipes. Nearby was a little engine belonging to a lumber company whose track ran in front of our works. We obtained permission from the company to use the engine for about an hour, got a piece of ¾-inch pipe, and ran the steam through the pipe into the holder. It relieved the trouble in a very short time.

Mr. Burrows—The experience is one that I sent in. We had always been able to obtain steam from our electric light plant, but at that time the electric light plant needed all its own steam, and we were unable to get any for our gas plant. Speaking of Mr. Clements' experience, people having electric light plants can very easily thaw out the pipe by tapping the wires. I never had occasion to do it myself, but it has been done in our part of the country.

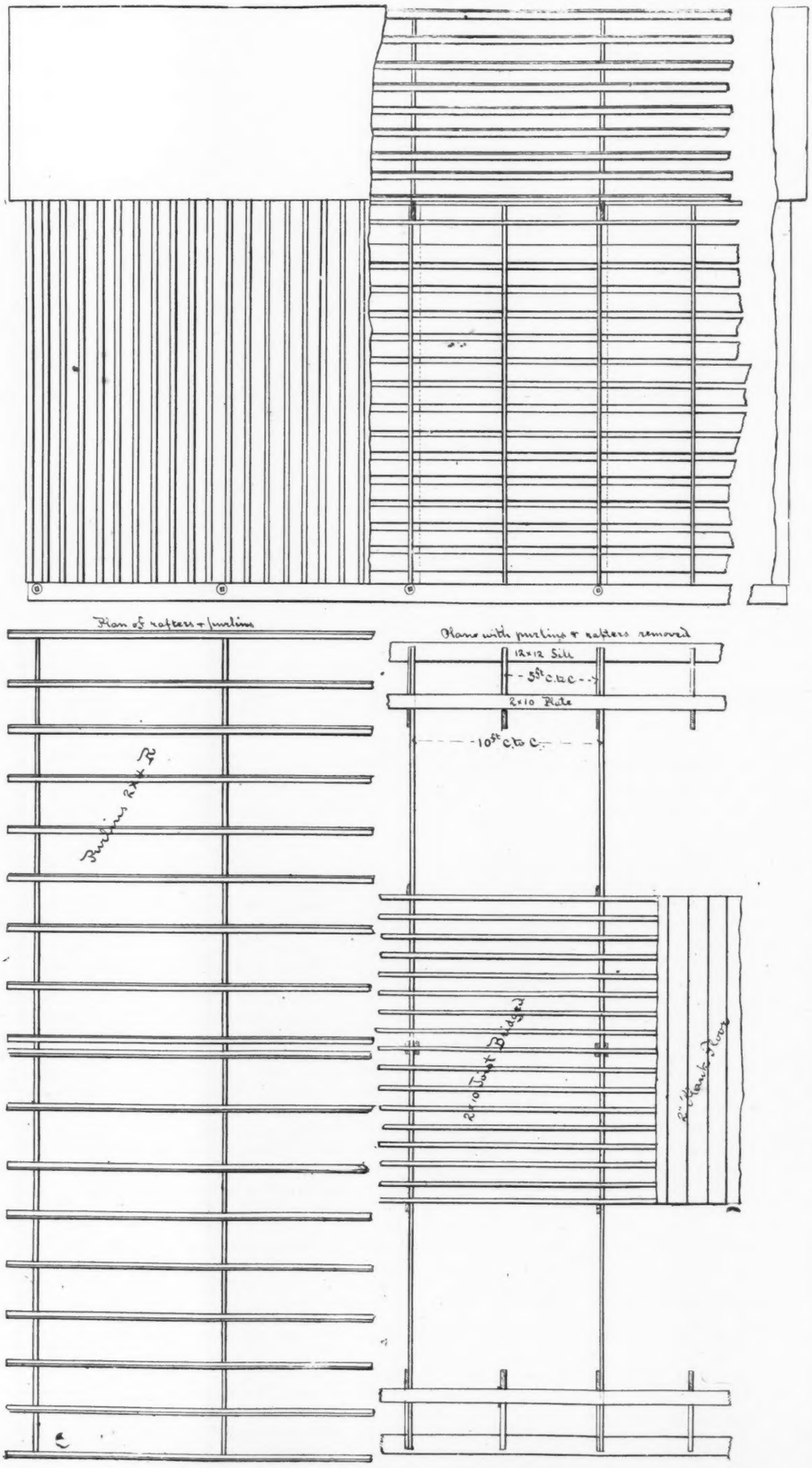
No. 3—*Handling Crude Oil.*—When the use of California crude oil here became general, it was at once apparent to the consumer that, aside from its B. gravity determining its fluidity, the element of viscosity had to be contended with. By viscosity we mean the "stickativeness" so to speak, or tendency to rope out and cling to containing surfaces. It has then been found that, whereas one oil of 16 gravity B. may be discharged from a car containing 6,000 gallons in 45 minutes, another oil of the same gravity B., but of greater viscosity, will require 10 or 12 hours to discharge the same quantity. This element of viscosity has been attributed to a superabundance of asphalt, and it is common to the oils which are pumped from the first strata of oil bearing sands. A viscous oil has also been found to be low in caloric power, hence those distributing companies handling only the best grade of fuel oil will only permit their wells to be perforated at the lower strata. But as long as the slump holes of the Kern river are filled with this low grade oil, just so long will the consumer be liable to purchase same, on account of a lower price, which is very often added to by demurrage charges. Where such a car of low grade oil is received, the vexations of discharging same begin. Some will steam it for hours at a time with little effect. When it is possible to apply it, the following has been found to solve the difficulty: If oil is pumped from car to receiving tank and car of viscous oil is received, connect same to pump, draw off a few inches from the car, then reverse your pump connections and force back into the car a lighter grade of oil, which will have an immediate effect on the viscous oil. Repeat this operation once or twice and you will find that the car can be pumped off much quicker and with less trouble and expense than if steam heat were applied.

Discussion.

Mr. Lowe—What happens if you do not have a light grade oil?

Mr. Gregory—That was what bothered me.

Mr. Lowe—Many of the tank cars are provided with steam coils to which we attach some pipe from the gas works; of course, in water gas methods we always have steam. Sometimes we have to carry it 400 or 500 or 1,000 feet, but we never have any difficulty in getting a supply to the car. Occasionally the cars are not provided with coils, under



Experience No. 1.—Coal Shed for the San Jose Light and Power Company.

which circumstances you can either put a small coil through the hole in the dome, or you can run in the steam pipe. If you do that you will get considerable water in your oil, but it will flow out. There is no trouble in handling the oil if you have steam.

Mr. Jones—We are using 300 barrels of Bakersfield oil per day, and use no steam for heating the oil. I suppose the mean temperature of San Francisco is from 50° to 55°. We have a pump for forcing the oil into pipes and storage tanks set as low as possible, so that the pump may be primed from the cars. Regarding the fuel value of these oils, that which we use is about 15.3° B., and I believe that the oil has a fuel value almost directly in proportion to its weight per gallon. The heavy Bakersfield oil weighs a pound per gallon more than the light oils—Coalinga, for example. Of course, we must presume that the oil is free from sand and water, but with freedom from these two substances, I think it can be counted as good fuel by the pound.

Mr. Holberton—In pumping a heavy oil from cars where we have no steam coils, we take the exhaust from the steam pump and exhaust it against the bottom of the car where the oil passes out. I think if the intake of the pump is sufficiently large, however, it is not necessary to do that at all. I believe a better way is to dump the car, and not to attempt to pump the oil out. Place the car over a funnel and let the oil run out by gravity. I don't think there is any oil so thick that it will not run through the outlet of the car very rapidly if it is not obstructed in any way. Our new plant has an 8-inch cast iron pipe to take the oil from the funnel to the reservoirs. We don't attempt to fill the pipe, although the distance is not over 40 feet.

Mr. Lowe—I think Mr. Holberton has something to learn about heavy oils. At times I have opened the plug in the bottom of a car full and the stream that would come out would not be as large as a stream which a ½-inch pipe would supply. That usually occurs in winter. I find that a great deal of the heavy oil, from 12° B. to 14° B. (Mr. Jones is using an oil approaching 16° B.), contains lumps of stuff that will clog the car. If it is necessary to handle oil

of that description, you should he provided with steam. It is the only thing I know of that will handle it.

Mr. Holberton—Have you ever tried to close the top of the car and force in air?

Mr. Lowe—The cars are not as a rule fitted with means to do that. I am inclined to think that to move the oil freely it would take more pressure than you would want to provide under the circumstances. We find a plentiful supply of steam the simplest and best remedy.

No. 4—*Heating Oil.*—It is customary, when installing apparatus for the utilization of crude oil as fuel, to place a heater between the oil pump and the burner. This heater generally consists of a length of casing in which is inserted a coil of pipe through which the oil is forced on its way to the burner. The exhaust steam from the oil pump is discharged into the casing—thus heating the pipe contained therein—which carries the oil. Experience has shown that in this method of construction the heater possesses a serious defect, for, after a period of time has elapsed, it has been found that the intense heat of the steam surrounding the coil causes the oil contained therein to carbonize and deposit a solid substance, which will in time entirely clog the passage. To remedy this evil it is but necessary to allow the steam instead of the oil to traverse the small pipe and have the oil enter the casing and surround coil. With this method of construction, the carbonization is on the exterior of the coil, which can be readily cleaned by unscrewing the cap from the casing and scraping the coil of small pipe.

Discussion.

Mr. Clements - I have to acknowledge the child myself in this case. We installed, on the 24th of April last, an oil plant for the purpose of using oil as fuel under the boilers, and finding it working so successfully I thought I would try it with the benches. We were using pressure pumps to force the oil to the burners, and I applied it to the burner in the retort. I found that when the whole load of our plant was on the flow of steam became irregular, and consequently the flow of oil to the burner. To obviate that I installed a gravity plant which will be shown here later. It is a simple thing, but it works to a perfect charm in our case. Anyone situated as we are cannot do anything better than install something of the kind. The only question now with us is to find a market for our coke.

An adjournment was then taken until 2:30 P.M.

SECOND DAY.—AFTERNOON SESSION.

The meeting having been called to order, Mr. Gregory resumed his narration of "Experiences."

No. 5—*The Use of Crude Oil for Firing Benches and for Enriching Coal Gas.*—As we were installing an oil plant for the purpose of generating steam under our boilers, I thought I would try it under our benches. Accordingly I set to work to make the trial. As we had the pumping plant this seemed to be an easy matter, for as it had proved such a success under the boilers it seemed to me it should be equally successful under the retorts. So I had all connections for steam and oil arranged and made the trial. I found, however, that while the pumping proposition worked to perfection under the boilers, it did not do quite so well when applied to the benches. There seemed to be a lack of flow to the oil by this method and I concluded to try the very old method of gravity. I, therefore, set to work to arrange for that system, and made a "Wrinkle" of it, sending the same to Editor Hollidge. Any of our members can, therefore, see later on how it is done at our house. As this is an experience I shall not go into details of construction, but rather give you an idea of the financial saving that accrues. First, I will say that our works are among the smaller ones on this Coast, the average daily output being not over 25,000 cubic feet. We are using Bakersfield crude oil, of so-called 14° to 16° gravity, at a cost to us at a slight fraction over 2 cents per gallon; 70 gallons being sufficient for the 24 hours' run, at a total cost of not to exceed $1.50 per day. The cost of the same service under the old system of firing with coke was from $3 to $3.50 per day; thus you will see that there is a saving of fully 50 per cent. each day. In other words, there is an actual saving of $45 per month, or $540 per annum, besides the convenience and saving of hard manual labor, the discomfiture from heat attending the cleaning of fires, the breaking away of the furnace wall in the course of clinkering, and the constant firing of coke, etc. I know that many of the gas managers are loth to take up what seems to them a new thing, but this is not a new thing. It is an actual commonplace matter, and can be applied by any one using crude oil. Now, as to the use of crude oil as an enricher, I have found it very efficient and it can be used in a very simple manner. My method is to use shavings from the planing mill or carpenter's shop. Mix them up in a barrel or tub with the oil until they are entirely saturated, then fill a sack with the shavings so prepared, throw them into the retort on top of a spent charge of coal, replace the lid and let the good work go on. From this I have obtained very satisfactory results, thereby raising the photometric value of the gas 2 and 3 candles, using this same heavy Bakersfield oil. I have lately arranged a method of feeding this oil into the retort and have also given a statement thereof to Editor Hollidge. This is not in any sense original, but was taken in part from a "Wrinkle" presented by our late lamented member, Mr. Knight, of Marysville, Cal., and presented by Past-President W. R. Parker, in 1896, while he was Editor of the Wrinkle Department.

No. 6—*Economy of Firing Benches with Crude Oil.*—In response to your inquiry as to experiences in gas making, we may have hit upon a good idea for the small gas maker. In Stockton our gas make has decreased a good deal on account of the increase in our natural gas sales. We found it necessary to supply our coke trade, so began to experiment upon the use of crude oil to heat up the benches instead of using coke. We tried many schemes of using the oil, and at last hit the proper way to do the work and not to injure the bench. We now use a home-made burner of 1-inch and ½-inch pipe and fitting, using steam from our boiler to inject and force the oil under the bench at 60 pounds pressure. In this way we have the entire make of coke for our customers, and at the same time make a good profit by using oil as the fuel. Our benches are the common Weber benches of 5's, and have been in use three winters; so oil is a little warm for them, but they show no more than usual signs of wear.—H. E. ADAMS.

No. 7—*Value of Mixing Different Varieties of Coals for Retorting.*—At our works we have been using Wallsend and South Prairie coals in combination for gas making. We use in an ordinary charge two-thirds South Prairie and one-third Wallsend, which yields an average of 5 cubic feet of gas to the pound of coal so mixed. From this we obtain a first-class illuminant of a photometric value of 18 candles. We also find that these coals, when so combined, make an excellent quality of coke, easily withdrawn from the retorts and not in the least friable. The South Prairie coal is objected to by some managers on account of the very damp condition in which it is usually received. I was inclined to do the same, believing that it would prove to be more expensive after it had dried out than other coals, the first cost of which is greater. So I decided I would make a thorough test of it. Accordingly I had a considerable amount of it weighed while in the damp state, and then had it spread out on the floor of the coal bunker for several weeks before using it in the retorts. I found there was considerable loss as between the coal in the damp condition and the thoroughly dry state. This same lot of coal I had carefully weighed and handled, and an accurate account of the amount of gas made to the pound, and found that while there was a large percentage of loss in weight, yet the final result showed it to be a few cents cheaper per ton than the other coals that we were using. We found the percentage of sulphur to be greater than the other coals that we were using, but as we are well equipped for washing, scrubbing, condensing and purifying, we did not experience any trouble along that line.

President Britton's Narration of Experiences at Oakland.—I had promised Mr. Gregory a series of experiences from our plant, but an extraordinary amount of work prevented me from preparing them. While on an Eastern trip recently I was induced to purchase a proportional meter with a capacity of 75,000 cubic feet per hour. We put it into place because our old station meter had become worn out by actual use for over 26 years. Our experience with it was very satisfactory. Prior to that time our manufacture had been a matter of practical guess work, and therefore our leakage account was uncertain. After a time our experience began. We found that with a small quantity of gas the meter would not register. When our water gas exhauster was shut down and the coal gas only sent through (amounting to 3,500 feet per hour) the meter proved ineffective. The first fault we found with the meter was that the shunt valve on it, when opened by a very large amount of gas passing through, would not close again. We tried the experiment of strengthening the spring upon the shunt valve. Lubrication did not affect it. We took off the tally meter and found that one of the diaphragms had burst on account of imperfect construction—the meter manufacturer insisted that it was due to the bad conditions of our gas manufacture. After that the other diaphragms gave way, one by one. The fault was that the different parts of the tally meter were not provided with drainage to take off the condensation of the gas. The meter is in our station meter house above the floor, and the temperature of that room, as compared with the temperature of the gases themselves, no

doubt caused more condensation in the tally meter than would ordinarily be occasioned. It may have assisted in the deterioration of the diaphragms. Our Superintendent afterwards tapped into the different parts and drained off the condensation. The condensation in the shunt itself was nothing. There was no deposition of the residual products of the gas. But the arm of the registration part of the meter works so close to the diaphragm that it leaves an impression on the diaphragms, and finally cuts them. They gave way at last, and the meter stopped registering. The manufacturers have now provided a tally which I think will overcome entirely the difficulty of registration, and certainly will relieve it of the possibility of breaking the diaphragm. It seems to me that the proportional meter will be the station meter of the future. They are very compact. This meter of ours, which will take care of 75,000 feet per hour, occupies a space not to exceed 4½ feet long by 2 feet wide. Its cost is not more than ⅓ of that of the ordinary station meter of the same capacity. With the tally meter made so as to fit the conditions of the manufacture of artificial gas, and with the shunt valve adjusted so that it will be delicate enough to work under any conditions of the passage of gas through it—those two faults being overcome—you have a cheap station meter that is absolutely reliable under all conditions. Small gas works, particularly in California, which have not provided themselves with station meters, can, by investing in one, be able to stop going by mere guesswork, and obtain a definite and positive idea of what they are doing. Proportional meters have been used for a number of years in the measurement of natural gas, and the manufacturers in supplying them to be used with artificial gas, not taking into consideration the difference of the gases, did not prepare their meters for those contingencies. Now that they have learned from experience, they are correcting the faults, and undoubtedly the manufacturers to-day can turn out a satisfactory meter. My advice to the different small gas companies in this country would be, if they have not a station meter, to immediately put themselves into correspondence with some one of the manufacturers of station meters. Any works with an output of 10,000 or 15,000 or 25,000 feet per day can procure a reliable station meter at a cost of probably not to exceed (set up) $150 to $200. And if they do not save that amount twice over by a knowledge of what they are doing, I am mistaken in the effect that a station meter has in gas manufacture.

Mr. Osborn—How about the pressures?

Mr. Beck—When passing a small amount of gas it takes more pressure than when running full. At full capacity it takes ¾ inch to work the meter; at 3,000 feet it would take 2 inches.

Mr. Osborn—In small plants the idea would be to put a proportional meter between the works and the relief holder.

Mr. Britton—You might be troubled with depositions in the meter to prevent its proper working. The residuals would interfere seriously with your shunt valve, which is the real secret of the proper operation of the meter. If the shunt valve does not work the meter does not register.

Mr. Jones—I believe the Equitable Gas Company, of San Francisco, has a 100,000-foot proportional meter?

Mr. Papst—We installed a meter which passes about 100,000 feet an hour, and found at first it registered correctly, but after 5 or 6 months it began to run about 20 per cent. slow. We changed the pressures on the meter and found that the variation was from 15 per cent, to 40 per cent. Whenever we ran the meter to full capacity, or to within about 20 per cent. of the rated capacity, it registered correctly; while we were passing only 25,000 feet the meter would register 40 per cent. slow.

Mr. Britton—That was practically our experience. Don't you think it is due entirely to the fact that the shunt valve does not properly adjust itself to the opening under different pressures?

Mr. Papst—I believe the whole principle is wrong.

Mr. Britton—That is a pretty frank statement.

Mr. Papst—I do not believe the meter ever can be made to register correctly.

Mr. Britton—I cannot agree with Mr. Papst, for I believe the principle is all right. I think there is no question that gas can be measured by the proportional meter in varying volumes and pressures as well as in an ordinary station meter. I think it is entirely a question of the adjustment of the shunt valve. I believe that the construction of the shunt valve is wrong mechanically, but I also believe that the valve can and will be constructed so that the meter will take care of the gas.

Mr. Papst—Different gas companies in the East have gone to the expense of installing these meters, the Trenton (N. J.) Gas Company among others; but they had to discontinue their use because they did not give the proper registration after they had been in use for a time.

Mr. Lowe—If they registered correctly for a time, why would they not continue to do so?

Mr. Papst—Probably they did not really register correctly from the start. With a new thing you are apt for a time to rely upon its being correct.

Mr. Britton—We know as a matter of fact, from the prior and subsequent registration of an accurate wet station meter, that the proportional meter did register the maximum quantity of gas passed through it. Our coal gas goes to the purifiers in a different way than the water gas. We were sending 3,400 feet per hour, and the proportional meter did register it accurately; and until the shunt valve had become disturbed in its bearings, by some deposition or some mechanical error of its own, the meter continued to register properly. I am convinced from correspondence that I have had with the meter makers that in a very short time, with their wet tally and their new adjustable valve, they will have a reliable meter.

Mr. Lowe—I recently put proportional meters into the works at Santa Clara and at Redlands—two new plants. The principal objection that I have to the proportional meter is found in its manufacturer, who is so independent that he thinks he knows it all. We have a different kind of gas to handle, and must have a modified meter. At Santa Clara I watched the meter very closely and found a very curious condition of affairs. We were able to read the holder, and we could note, to within 10 feet, or even to within 5 feet, the amount of gas actually passing through, taking it at times when little or no gas was leaving the holder. We found that the average meter readings were almost correct. In some instances the meter registered more gas, in some cases less, and in some cases the exact quantity as close as we could read it; that is, to within 5 or 10 feet. I am frank to say that I believe the proportional meter is much better than nothing. The principal trouble is the doubt that exists in the mind of the man who is running it. You wonder whether it is measuring the gas or not. I can tell you, however, that it gives a very much more accurate registration than you could reach by the rise and fall of the holder; and little gas companies without a meter can do nothing better than to put one in, for it will give them a very much better idea of what they are making than they could obtain in any other way without a meter. The proportional meter for 20,000 feet costs $120. The Westinghouse meter requires about 2 or 3 inches pressure to run it; that is, it will absorb that much. In our practice we put the meter on before the gas goes into the holder, and the matter of throwing 2 or 3 inches more pressure on the apparatus amounts to nothing. Altogether I am quite satisfied with the proportional meter, but am very much dissatisfied with the independence of the manufacturers. They do not receive any suggestions with favor; but as they come to their senses you will find that the proporttonal meter is the coming station meter for gas companies.

Mr. Britton—They would meet with better success if they would pay less attention to the character of our gas and more attention to the mechanical construction of their meters. I agree entirely with Mr. Lowe. The letters I have received from the meter companies have been very obnoxious to me. They have simply attempted to find fault with our methods of manufacturing gas.

Mr. Beck—After the diaphragms of this meter of ours burst we repaired them, started it again and it registered correctly. Then in the small proportional the registration was not correct. We adjusted the spring on the main valve, and that started the meter again so that it registered absolutely correct. The machine will register correctly if it is properly adjusted.

Mr. Lowe—The one peculiarity I found with the meter was that it was apt to stop. You will find no gas registered, notwithstanding that it is passing through freely. That is apt to throw doubt in a man's mind at all times. I believe that when the meter is registering at all, it is registering a correct average; but it will stop occasionally. I am inclined to think that that was Mr. Papst's trouble. The meter instead of registering incorrectly stops entirely.

Mr. Papst—It stops if the pressure is too low. I believe that if you put the meter where it will get enough pressure, it will run, and you will have no trouble with it. I would strongly advise a small gas company to buy a proportional meter.

Mr. Britton—Respecting Mr. Burrows' question as to the registration of the proportional meter, I would say the tally meter only registers a very small proportion of the gas. The proportional in our meter is 200 to 1.

Mr. G. H. Hollidge, of Merced, Cal., Editor of the Wrinkle Department, then handed in the following list of

WRINKLES.

To the Pacific Coast Gas Association—Gentlemen: At this the ninth annual meeting of the Pacific Coast Gas Association, I beg to submit for your consideration the following Wrinkles. Although few in num-

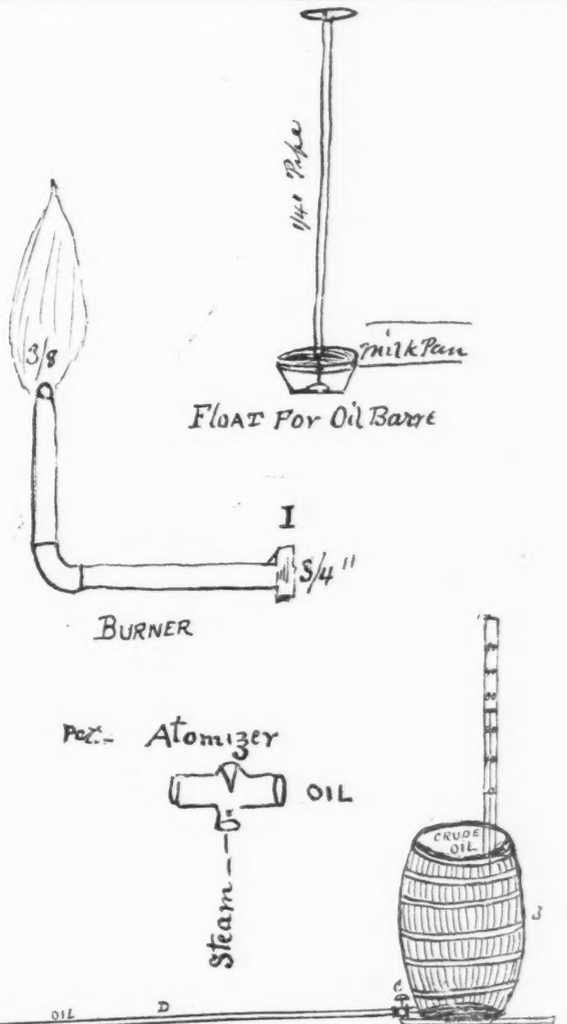
ber, owing, I presume, to the limited time which members have had to spare, due to the extreme pressure of additional business which has crowded upon us all, yet I thank the members very kindly for their cordial replies to my letters and for the Wrinkles that have been contributed, hoping next year may bring forth a more bountiful supply.

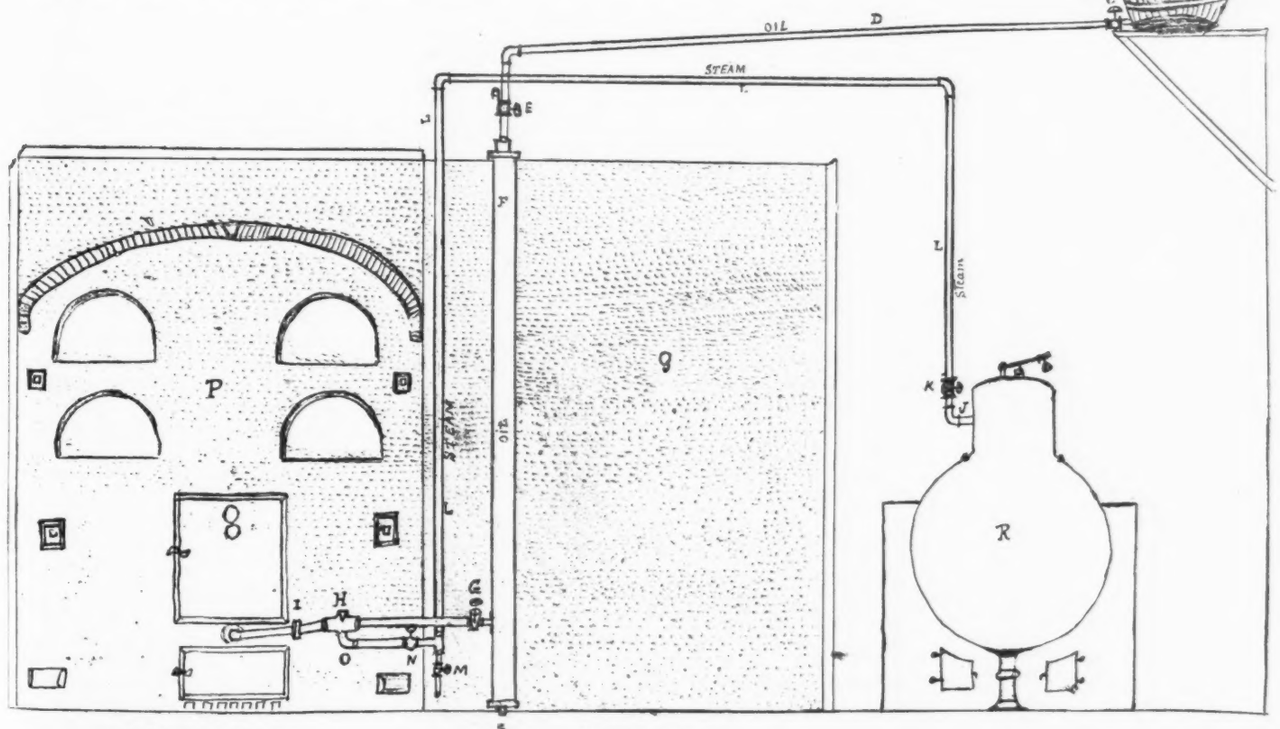
No. 1—*Device for Using Crude Oil for Bench Fuel.*—This is a device for using crude oil as fuel under a bench of retorts, which has effected a great saving over the use of coal or coke for the same purpose. The system is as old as the gas business, and no doubt has been applied by many in various forms. This Wrinkle, as it is now installed at the plant of which the author has charge, is making a daily saving of not less than 50 per cent. The cost of erecting it is of very little importance when compared with the amount saved. It has been now in use about three months and has worked without a single hitch. The accompanying drawing is self-explanatory.—JOHN CLEMENTS.

Discussion.

Mr. Clements—This consists of a reservoir to hold oil, the reservoir being an ordinary oil barrel holding 55 gallons. The oil flows by gravity to a 2-inch pipe that runs up the face of the bench. We get sufficient heat from the bench to keep this heavy Bakersfield oil quite warm. This gives a little extra supply to the burner. The barrel is set 30 feet away from the bench on the other side of a partition wall. Of course, it may be located to suit conditions. Going down into the hopper is a piece of 2-inch pipe ending in a plug, so that the sediment can be let out rapidly. We tap this a short distance above the center line, between the upper and lower doors of the bench, leaving a space for any sediment. It then goes to a patented burner, which we use under our boiler and for this purpose. The steam is taken from the boiler, carried over, and comes in conjunction with the oil at this atomizer or burner. A hole is made through the wall by taking out a brick. The burner enters through it, just passing inside, not projecting any more than is necessary. A union on the outside connects this portion of the pipe leading from the atomizer so that it can be uncoupled and pulled out if we want to bank the fire. The point of the pipe is reduced to $\frac{3}{8}$ inch in diameter by being hammered down, sending out a flame that heats up the entire bench but does not strike the wall. I have been taught to believe that if you spray the oil on the walls it will burn them out fast. By this means no oil whatever strikes on the walls.

Mr. Parker—What is the consumption of oil per hour?





Wrinkle No 1.

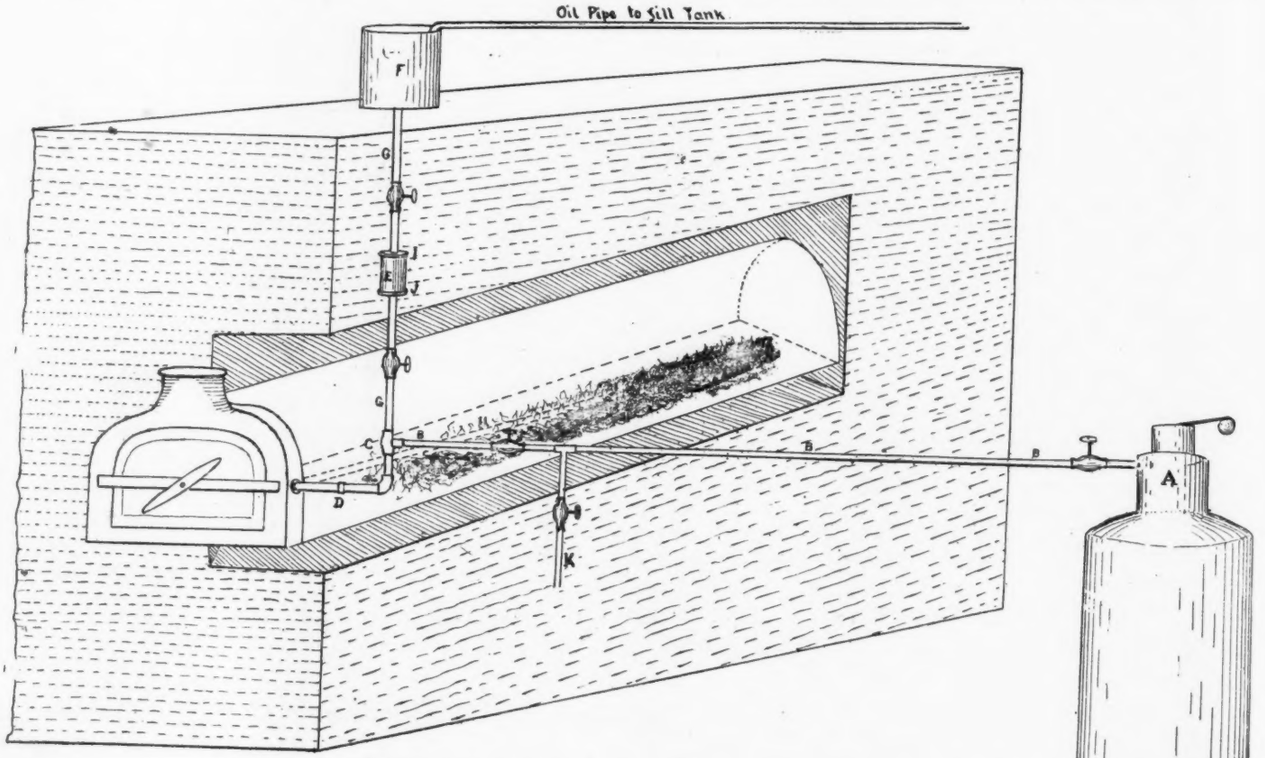
A.—Shelf 20 feet from floor.
B—Barrel or tank.
C.—Globe valve or stopcock.
D.—1-inch oil pipe.
E.—Globe valve or stopcock.
F.—2-inch pipe used as oil heater.
G.—¼-inch needle valve.
H.—Atomizer. Patented.
I.—Union to connect burner nipple.
J.—Steam connection at boiler, ½-inch pipe.
K.—Globe valve.
L L L L.—¼-inch steam pipe.
M.—⅜-inch pipe and globe valve. Steam bleeder.
N.—¼-inch globe valve. Steam to atomizer.
O.—Steam connection to atomizer.
P.—Front wall, bench retorts.
Q.—Reserve bench.
R.—Steam boiler.
S.—Plug in bottom oil heater.

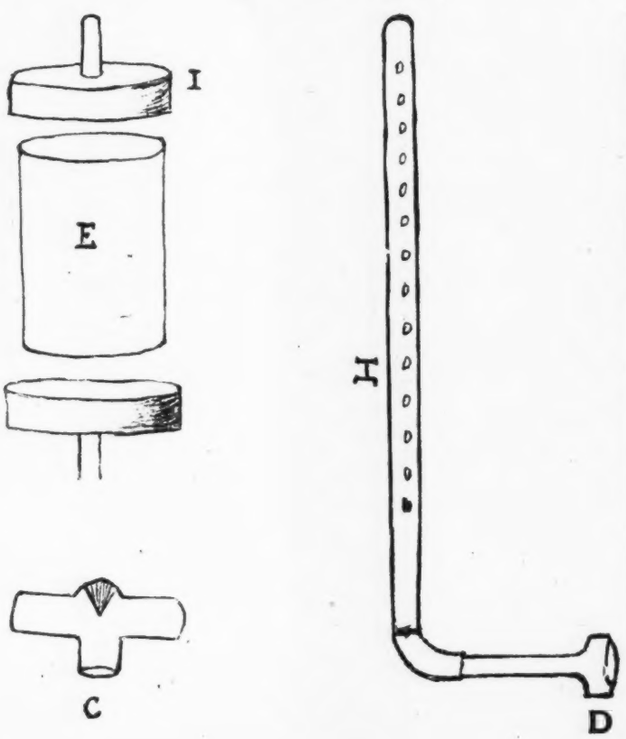
Mr. Clements—About 65 gallons in 24 hours.
Mr. Parker—What steam do you maintain?
Mr. Clements—Eighty pounds on our boilers, for all purposes.
Mr. Parker—Does it operate best under that pressure?
Mr. Clements—I have never tried it very much with any variation.

Mr. Holberton—We have had some experience in Oakland with the same type of burner. The pressure of the steam depends upon the pressure of the oil. There is a tendency for the oil to be driven back if the steam pressure becomes too great. We find it necessary to maintain quite a pressure on the oil as compared with that on the steam. Probably, although Mr. Clemens has 80 pounds pressure, he has it throttled down. I imagine that he does not turn his full 80 pounds of pressure on the burners. We find that with 110 pounds of steam, throttled down to 85 or 90, we have to have a pressure of between 30 and 40 pounds on the oil to get satisfactory results.

Mr. Clements—We have 40 pounds on our oil and 80 pounds of steam.
Mr. Holberton—That is about what we have.

No. 2—*Device for Using Crude Oil for Gas Enrichment.*—This is a device for the use of crude oil in the enrichment of coal gas. It is quite simple, as will be seen by the sketch. The oil is pumped into a receiving tank, which may be of any desired capacity, thence it flows by gravity to the sight-feed glass, as shown at *E;* thence to the atomizer *C*, where the oil and dry steam unite, the mixture being forced into the retort through the pipe *H*. The object being to increase the photometric value of the gas, the oil is sent into the retort on a spent charge of coal and run for about one-half hour before the coke is withdrawn. The several parts of this Wrinkle are explained by the descriptive list accompanying the sketch. The author of this Wrinkle claims for it that it is a simple method of enriching coal gas where oil is available. He does not, however, claim originality for it, but simply wishes to show how he has applied old principles at his plant.—JOHN CLEMENTS.





Wrinkle No. 2.

A.—Steam dome.
B B B.—Steam pipe, size ¼ inch.
C.—Atomizer.
D.—Union, size ¾ inch.
E.—Argand chimney,
F.—Oil tank.
G G.—Oil pipe. *H.*—Oil pipe, inside retort. *I J.*—Cast iron caps. *K.*—Steam bleeder.

Discussion.

Mr. Quilty—Is that a heavy oil?
Mr. Clements—It is Bakersfield oil.
Mr. Hollidge—What is the candle power of the coal gas?
Mr. Clements—Abut 18 candles, but we can increase that 2 or 3 candles at any time. We have no shale and do not want to go to the expense of buying it. Sometimes we want to enrich the gas, and have found this an efficient way of doing it.

No. 3—*Cheap Purifier Trays.*—I had some redwood boards surfaced to ¾-inch thickness and ripped into 1½-inch strips, and the strips sawed into blocks 2½ inches long, for spacing pieces. With common plastering lath and tenpenny wire nails I made good, serviceable trays which cost 2½ cents per square foot. There is quite a knack in making them. I made a gauge frame the height of the width of the tray and marked places for the spacing blocks. I first placed 3 blocks in position and laid a lath upon them, then 3 more blocks and another lath, then began

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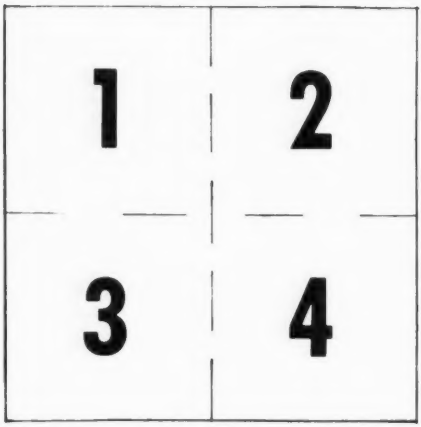

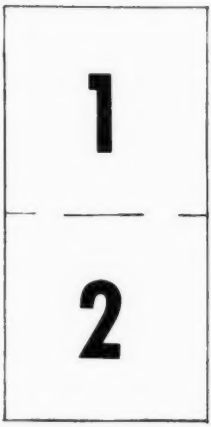

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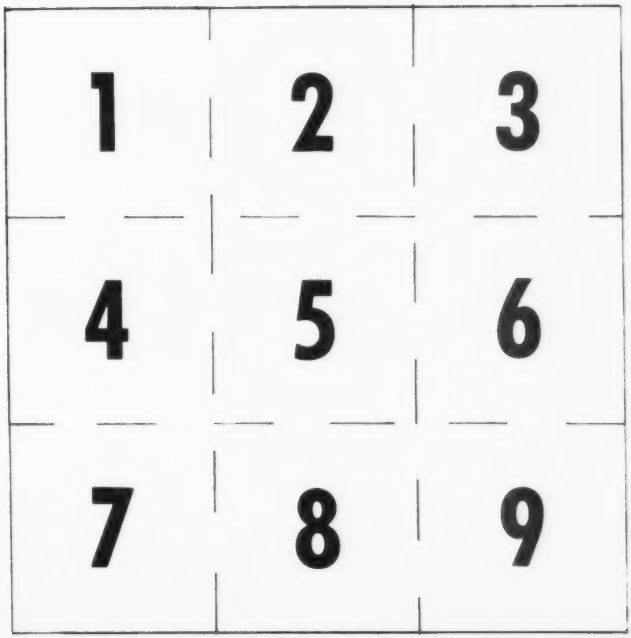

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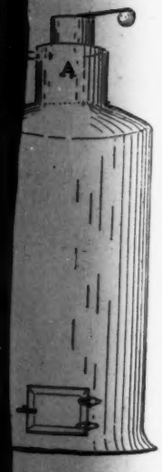

K.—Steam bleeder.

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LOOSE LEAF ACCOUNT SHEET FOR COMBINED GAS AND ELECTRIC COMPANIES

SHEET NO. _____

DATE	GAS ACCOUNT						INCANDESCENT LIGHT ACCOUNTS																
							CONTRACT							FLAT RATE			METER ACCOUNTS						
	STATEMENT	CONSUMED	AMT. DUE	REBATE	AMT. PAID	DELINQUENT	LAMPS WIRES 4	5	8	10	16	24	36	C.P.	AMT. DUE	REBATE	AMT. PAID	STATEMENT	DIFFERENCE	FACTOR	NET WATTS	AMT. DUE	REB
JAN'Y.																							
FEB'Y																							
MARCH																							
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Wrink

INCANDESCENT LIGHT ACCOUNTS

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Wrink

No. _____ STREET. _____ CUSTOMER No. _____

	POWER								ELEC. ARC ACCOUNT					TOTAL	TOTAL	TOTAL AMT.	
	FANS		MOTERS														
MT. AID	NO.	AMT. DUE	NO.	H.P.	AMT. DUE	REBATE	AMT. PAID	DELINQUENT.	NO	AMT. DUE	REBATE	AMT. PAID	DELIN-QUENT.	DEBIT	REBATE	PAID	DATE PAID.

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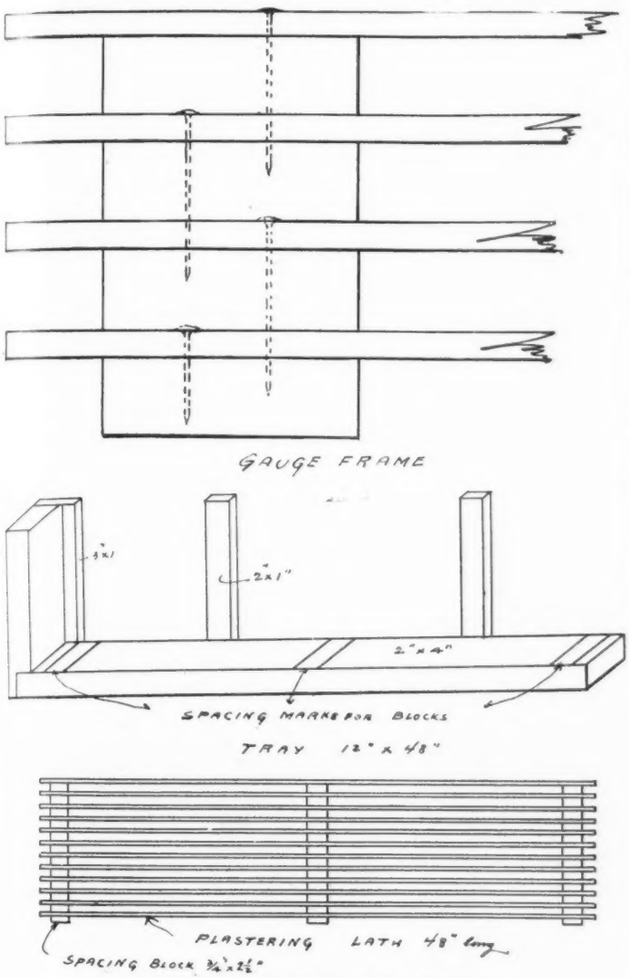
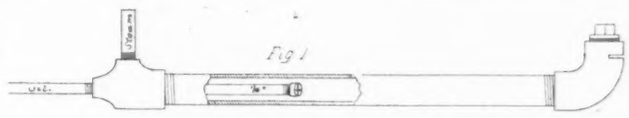


Wrinkle No. 3.—Economical Purifying Tray.

nailing. The first nail goes through both laths and both blocks, then 3 more blocks, another lath and nail again. Thus each block with lath is twice nailed. When the tray is built up the desired width, turn bottom side up, lay on a lath and nail with a wire shingle nail and the tray is finished.—C. M. CONVERSE.

No. 4—*Oil or Tar Burner.*—Figure 1 shows the construction of a burner for crude oil or tar. It is constructed entirely of pipes and fittings, such as are found around all gas works and machine shops. The larger or outer pipe, being ¾ inch by 18 inches long, is screwed into a tee. Through the straight opening of the tee, which is bushed down to



Wrinkle No. 4.—Oil or Tar Burner.

required size, a ¼-inch pipe is screwed, which enters into the ¾-inch pipe about 6 inches, and is capped as shown in the drawing. The cap has an opening in the form of a cross, which is filed or sawed through the end to allow of the flow of oil. The large pipe carries on its furnace end an ell, plugged. A slot is filed or sawed of the proper size for the size of the flame desired. The steam is admitted to the large or outside pipe through the side opening of the tee, as per drawing. The author of this drawing has had excellent results from the use of this burner; in fact, much better than were obtained from some of the expensive burners on the market, the cost of the burner being comparatively nothing.—CHAS. HUGHES.

Discussion.

Mr. Britton—We use a similar thing at Oakland The nozzle is made by hammering the end of a ⅜-inch pipe so that the orifice is very small and sprays the oil.

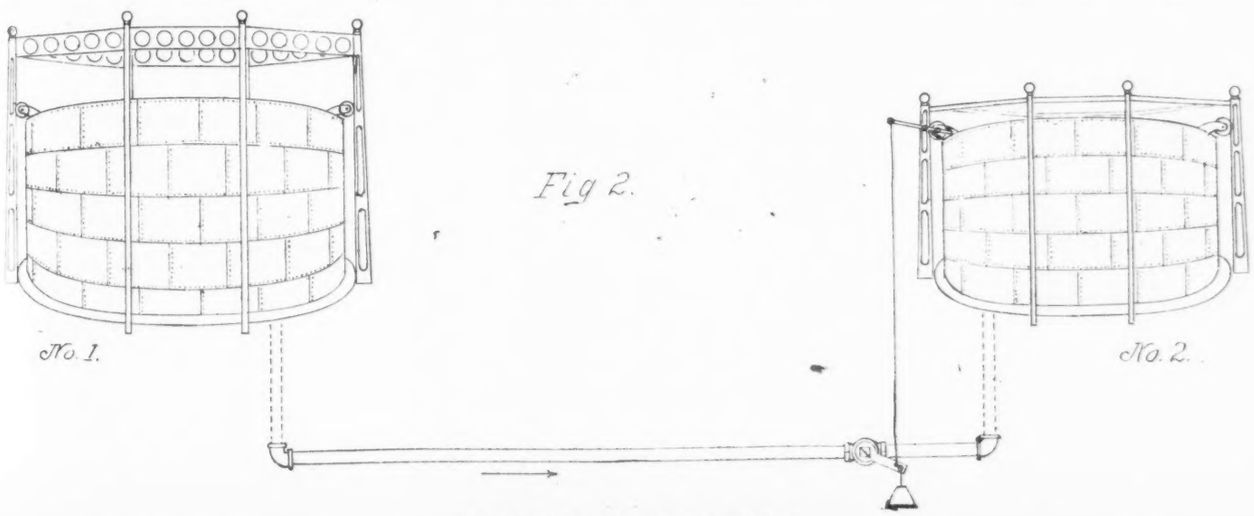
No. 5—*Valve Automatically Closed.*—A device for automatically closing valve between relief and storage holders as shown in the drawing. When the gas is being used from No. 2 holder it, in its downward movement, opens the valve or stopcock, allowing the gas to flow from holder No. 1, as is made evident by the drawing. The upward movement of holder No. 2 closes the valve and stops the flow of gas. It has been in use for about a year, requiring no attention whatever and giving entire satisfaction; whereas, prior to its adoption, the time and attention of a man were required for opening and closing the valve, it now functionates quite automatically, besides maintaining a perfect regulation of pressure on the mains, owing to the fact that the No. 2 holder varies in height but little.—CHARLES HUGHES.

Discussion.

Mr. Grimwood—I would suggest increasing the length of the lever on the stopcock or valve, and placing the weight between the fulcrum and the power. This can be so adjusted as to permit the use of a much heavier weight to insure the positive closing off of the gas, and the longer power arm would enable the holder to lift this greater weight without additional strain. The fact that it would travel a few inches more to accomplish the work should offer no objection.

No. 6—*Loose Leaf Account Sheet for Gas and Electric Works, Showing Every Detail.*—I send you blue print showing form of loose leaf account, intended to cover on one sheet the consumer's account for gas and the different forms of electric business. We found the annoyance of having several books for the various accounts to be considerable, and this sheet was devised by C. E. Burrows, Jr., to meet conditions and is believed to be a success.—C. E. BURROWS.

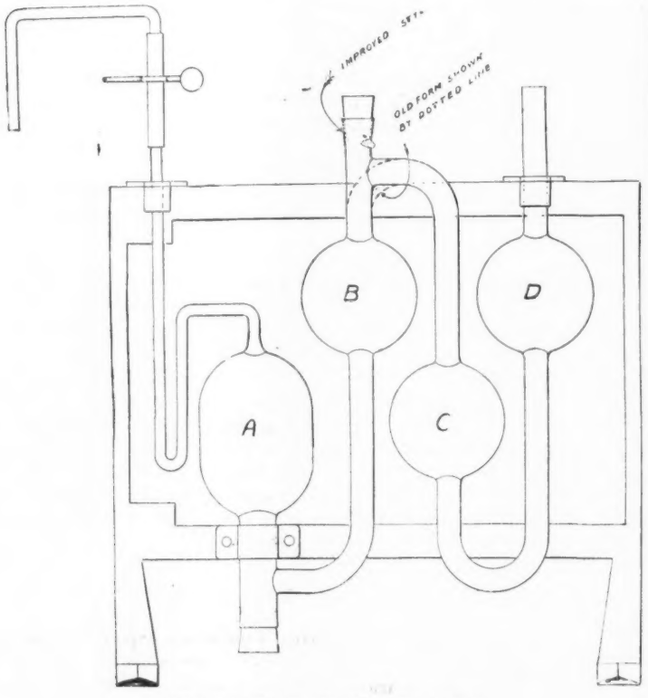
No. 7—*Pipette for Gas Analysis.*—Some years' of experience with the difficulties encountered in filling the ordinary form of Hempel's double-absorption pipette for solid and liquid reagents suggested the



Wrinkle No. 5.—Valve Automatically Closed.

modified form shown in the accompanying drawing, the purpose of which is evident.

Those of you who have had to fill these pipettes appreciate the impracticability of introducing the reagent through the capillary as proposed in the text books, and have probably adopted the simpler and far quicker method of inverting the pipette and pouring in the liquid reagent through the opening intended for solids. This also has its attendant disadvantages, which are mainly the necessity of removal of the water seal, in bulbs *C* and *D*, and the subsequent difficulty in properly adjusting the water level in the seal bulbs due to the air (or nitrogen)



Wrinkle No. 7.—Pipette for Gas Analysis.

trapped between bulbs *B* and *C*. By making the pipettes with a tee above bulb *B*, the side outlet of which is connected with the water seal bulbs, it becomes a simple matter to add fresh reagent without disturbing the water seal. The tee is closed with a rubber stopper. Solids are introduced from below in the usual way. Objections to this form, on the ground that the pipette is weakened thereby, are futile, as once properly fastened to the standard no strain can possibly be put upon the glass. Pipettes can also be made in which the reagent bulbs and those containing the water seal are blown in two separate pieces, the connection between *B* and *C* being made with rubber tubing, removable at will.—J. B. Grimwood.

No. 8—*A Universal Elbow Joint.*—I have here a universal elbow joint which probably most of the members have seen. It came to my notice only a few days ago. I asked the dealer to let me take a sample of the coupling for the purpose of showing it to the members of the Association. It is a double-flanged affair with the flange set at an angle, and so constructed that it can be placed in any position. Heretofore we have been showing only our own devices. As a matter of fact a large number of valuable things are on the market, and if we could show them here I think it would be of great assistance to the members. I believe we should ask manufacturers to send any novelties they may have. If they would pay for the carriage we could agree to exhibit them.—S. C. Lowe.

Discussion.

The President—I regard that as one of the best things ever proposed. We have been too conservative in the past. Such things as this adjustable flange and "Cox's Gas Flow Computer" are worth a great deal to the gas man. The "Computer" has saved me its cost 100 times over. I hope the suggestion will be carried out. I would like to have a motion made so that the Secretary will have power to act.

On motion of Mr. Lowe it was resolved that the Secretary be authorized to invite the presentation to the Association of articles that may tend to the advancement of the business or to the relief of the troubles of its members, and that the matter be left to him with power to act.

[To be Concluded.]

Some Notes on Electric Light and Power Distribution.[1]

By M.E. Daniel W. Mead, Consulting Engineer, Chicago, Ills.

The Electric Generator.—The extending use of electricity as a means of energy transmission and distribution for power, light, etc., has made it desirable for the engineer, who may not be an electrician, to be able to intelligently select transmission and distribution plants and the various apparatus to be used in such plants; to lay out and calculate the necessary circuits, and to estimate the energy losses in such systems, in order that such systems may be compared with other means of energy transmission, and in order that systems installed may work without unnecessary loss and in a satisfactory manner.

In view of these facts the following notes and data on the subject are presented. These notes are intended only to give an outline of the subject, and to point out the basis for calculations and estimates.

In any transmission plant the system may be considered to originate with the prime mover or primary source of power, which may be a steam engine, gas engine, water wheel, or any other source of power which may be used in any particular case, and from which the power to be transmitted is derived. It is not the purpose of this paper, however, to treat at length of such motors, or of the means of connecting them with the generators of electric systems. These subjects will be, however, briefly considered in relation to their individual efficiency, and their effect on the efficiency of the entire plant.

The electric generator or dynamo is a machine for the conversion of mechanical power or kinetic energy (that is, energy in the form of motion) into energy in the form of the electric current.

The dynamo is by no means a perfect machine. Like all other converters of energy, it loses by friction and in other ways a portion of the energy which it receives, and converts only a percentage of the same into the electric current.

Nevertheless, the dynamo has reached a point quite as near mechanical perfection as any other machine. Like most other machines, also, the dynamo gives its greatest efficiency when operating at its rated capacity, and loses in efficiency as its load becomes less than the rated load.

Messrs. Crocker and Wheeler, in their work on "The Management of Dynamos and Motors, give "the ordinary values of the various losses in a good dynamo or motor of 25-horse power, or more," as follows:

	Power Lost.
Used in magnetizing field (1 to 3) average.....	2 per cent.
Loss in armature resistance (1 to 3).....	2 "
Friction in bearings, average	2 "
Friction in brushes, average	.5 "
Friction in air, average.....	.5 "
Hysterisis in armature core, average.....	1.5 "
Foucault currents in armature core, average..	1.5 "
Total losses.....	10 per cent.
Useful power developed (output of dynamo)...	90 "
Total input of power.....	100 per cent.

At less than full load the losses do not decrease in proportion to the actual power delivered, hence there is an increased proportional loss, or a reduction in efficiency at partial loads.

For the purpose of this paper the principle of generation, or of dynamo design, will not be considered. The essential facts in this connection are the kinds of dynamos which are in use, and the peculiarities which affect their use, and the distribution of the currents which are generated by them.

In general, dynamos, and electric motors also, can be divided into two classes—direct current machines and alternating current machines.

In the direct current machines, the current is continuous and of one character.

In the alternating current machines, the current is alternately positive and negative, the changes being frequently very rapid, sometimes as high as 7,500 cycles per minute, or more.

The following are the forms of machines in common use and their most important uses:

1. The constant direct current generator, or arc machine, is wound to maintain a constant or uniform current (that is, a current constant in quantity), and usually either of about 6.6 or 9.6 amperes. In this machine the voltage (or pressure) increases in proportion to the resistance in circuit. With this form of generator the resistance must be arranged in series, the current passing in turn through each resistance, although some machines of this class are arranged to take care of two or more circuits.

1. *Municipal Engineering.*

2. The constant potential direct current machines are arranged to carry a voltage (or pressure) which is to be kept constant at a center of distribution. The voltage of these machines usually varies between certain limits, the maximum being about 110 per cent. of the minimum. In these machines the amperes or quantity of current increase according to the current used for various purposes. These machines are usually wound for:

110	minimum voltage.	125	maximum voltage.
220	" "	245	" "
500	" "	550	" "

The first two types are used most largely for light and power circuits. The last one is most commonly used for traction purposes, although all are applicable and are used to some extent for each purpose, when properly arranged and under suitable conditions.

With these machines, the resistances, that is, the lights, motors or other apparatus in which the current is utilized or consumed, are connected in parallel between the wires; but if they are of comparatively low resistance they may be placed in series until the resistance equals the given voltage; that is, two 110-volt lamps may be run in series between the wires of a 220-volt system, or 10 arc lights having a resistance requiring 45 to 47 volts to overcome the resistance in each lamp, can be operated in series between the wires of a 500-volt power circuit.

Commonly, alternating generators are designated as single-phase, monocyclic, 2-phase or 3-phase. The single-phase generator and distributing system is the simplest and is mainly applicable to lighting systems, and where only a few, if any, motors are used. The greatest objection to the single-phase system for general use has been due to the fact that motors of this type could not be readily started up when carrying their load. This objection is, however, being overcome to a certain extent, as single-phase motors giving satisfactory results are now constructed in sizes up to 15 and even 20-horse power.

The monocyclic system is a modified single-phase alternating system designed for localities where a certain amount of motor work is desirable. With the advent of successful small single-phase motors its importance is, however, considerably lessened. The monocyclic system is a 2-wire system in which a third wire is run from the generator to those points only where motors are used. This wire is termed the teazer wire, and produces the necessary lagging current to start the motor.

The 2-phase system is a 4-wire system, from which lights can be taken from the wires of either phase. For motor work, however, the 4 wires from the generator must be run to each motor.

The 3-phase system is particularly advantageous for installation where the load consists largely of motors. Its especial advantage is the saving in wire effected by its use over other alternating systems—a matter further considered in later articles.

Alternating generators are usually designed for from 25 to 125 cycles per second. Below 40 cycles per second, however, they are not found altogether satisfactory for lighting purposes. From 40 to 60 cycles per second are usually considered the most advantageous frequencies for combined power and lighting systems.

For incandescent lighting alone, in cases where no very long transmission of current is necessary, the 125-cycle machine is entirely satisfactory.

For arc lighting with the alternating current, a very successful method consists in the use of what is known as a "constant current transformer," placing the arc lights in series on the same general plan as with the direct current series arc lighting system. For arc lighting from 40 to 60 cycles are preferable, as the lamps are not entirely satisfactory on either higher or lower frequencies.

Since alternating currents appear to seek the outer surface of the wire, the carrying capacities of wires in alternating practice are not in proportion to their cross sections, as is the case in direct current systems. For this reason smaller wires are more economical and are usually adopted, especially in the higher frequencies. Other losses due to the nature of the current are also entailed in alternating work.

As far as the generator is concerned, it is well to remember that the lower the number of cycles, the larger the wire that can be used without inductive losses. In a general way, 25 cycles per second may be considered as ideal for power purposes where no lighting is used. The machinery, however, is considerably more expensive than apparatus of higher frequencies. For lighting purposes 60 cycle, single-phase, 2,000-volt machines may be considered the most satisfactory, both from the standpoint of general adaptability and expense.

Alternating generators for lighting purposes are usually wound for 1,040, 2,080 or 3,120 volts at no load and compounded for 10 per cent. higher voltage at full load to overcome the drop in the line and transformer, and keep automatically a constant voltage, as nearly as possible, at the lamps.

Alternating motors of 50-horse power and over are often made in voltages that correspond directly to the voltage of the generator by which they are to be operated, but the smaller sizes are usually wound for 110, 220 or 550 volts, and must be operated through transformers, except where generators of similar voltage are used, which, in alternating practice, is of somewhat rare occurrence.

Some Difficulties with a Gasholder.[1]

[A paper read by Mr. J. G. Toms, of Waterford, at the last meeting of the Irish Association of Gas Managers.]

At about this time last year I was in dire trouble owing to the vagaries and the utter unreliability of the largest holder (No. 3) at the Waterford gas works, where I had just taken up the managership, and this paper details the experience I have had in connection with this holder for the past 12 months. The holder is a 3-lift one, erected 25 years ago, diameter 80 feet, depth of tank 12 feet, with the usual cast iron columns, 12 in number, and guide framing. When full the holder contains 133,000 cubic feet.

Owing to the very soft subsoil—peat—the tank of holder, which is a concrete one, had gradually sunk, mostly on the side where the peat is deepest, until the tank was 14 inches out of level. It was then necessary to level up the tank walls, put distance pieces of proper height under base of columns (thus having all columns on one level), and to put new concrete resting blocks in tank for shells of holder to rest level on when down. This was done during the summer of 1899, and I understand that when the holder was first used after these alterations it worked satisfactorily. But in a few weeks' time trouble commenced, the holder jamming and not cupping properly. This was owing to the fact that the timber blocks used for packing up shells of holder while the permanent resting blocks were being put in were not removed. After the holder had been working for some little time, some of the blocks found their way between the shells of holder, thus causing the holder to jam, and by getting under the lute plates they prevented the holder from cupping properly.

During the following winter further trouble was experienced in working the holder. A number of timber blocks were taken up from between the shells by means of various contrivances, but not without doing considerable damage to the holder, and a good deal of gas was also lost. From the number of blocks taken out, and there being no trouble for a spell of several weeks, during which time the holder was carefully watched, and the pressure thrown by it recorded, it was thought there could be no more blocks in. Consequently the tank was not emptied during the summer of 1900. The columns having been plumbed, it was thought there would be no further trouble with the holder. This was done just previous to my advent in Waterford.

Such was the case, however. I had been in charge a fortnight when the holder unsealed at the cup, and we lost 36,000 cubic feet of gas. This happening at midnight, or thereabouts, no one was aware of the fact until the foreman stoker went to take stock at 1 A.M. In consequence, a steam pump was connected up and the cups filled with water every hour, and the holder carefully examined every quarter of an hour. It was decided to counterbalance the holder at three equidistant points, connected by three steel wire ropes to one counterbalance weight, the object being that before any one point could descend out of level it must take the whole weight of the counterbalance off the other two points. Also, it was decided to guide the holder by means of outside rubber-tyred rollers bracketed on to grips of second and third lifts and on to tank walls.

Before we had time to make any progress with this work we had another mishap, the holder, when almost full, unsealing at the cups, when 60,000 cubic feet of gas was lost. This happened at 4 o'clock in the afternoon. I was on the spot myself, and a few minutes before had taken the levels, when the holder was not more than 2 inches out. We were at a loss to account for the mishap at the time, but subsequently two pieces of timber, 32 inches × 9 inches × 4 inches and 30 inches × 7 inches × 3 inches, respectively, were found under the lute plate of second lift. They were badly scored and had the appearance of having had a rough time.

After this all haste was made to get our proposed counterbalancing and guiding arrangements fixed and working, and in a short time we had everything in working order, when there was immediately a noticeable improvement in the steadiness and general working of the holder.

1. *Gas World.*

I think the efficiency of the treatment may be reckoned by the fact that although during last winter 18 pieces of timber were taken from under the lute plates, we did not have a single mishap, neither did we lose any gas. During the present summer the tank was emptied and 13 pieces of timber and 1 ladder taken out. So I think we can say good-bye to our troubles in this direction. It is a question whether the faulty working of the holder was primarily due to the timber left in the tank; although at the time it was decided to counterbalance and guide it outside it was supposed there was no timber remaining in the tank.

I am unable to state whether the satisfactory working of the holder for the past 11 months is due to one or other of the two systems, viz., guiding or counterbalancing, as they were both completed at the same time, and have both been working in conjunction ever since. My own impression is that the guide rollers are mostly responsible for the improvement. Although there is no more timber to contend with, I would not care to work No. 3 holder without rollers. As the work in this case was all carried out by our own workmen the expense was not great. Our total storage is 215,000 cubic feet; our maximum 24 hours' output last year was 345,000 cubic feet. So I think you will agree our position this time last year was not an enviable one.

Discussion.

Mr. S. B. Langlands, Coleraine, said it was tolerably clear that Mr Tooms had not had his troubles to seek. It was a most extraordinary state of affairs, this timber all floating about inside the holder, getting into the cups, and so forth. The only experience he had had that possessed any degree of similarity was one at a small works to which he was called in. In that case there were no guide rollers on the bottom of the holder. The holder, which was a very small one, jammed, and they had to put their shoulders to it or use a crowbar to get it into action again. He suggested that guide rollers should be put, not on the holder itself, but on the edge of the tank; and that arrangement worked most successfully. He remembered, in another case, of a holder uncupping, and he could well imagine Mr. Tooms' state of mind when his uncupped. Years ago, when he was an assistant manager, he was working late making some drawings of a new holder when all at once, about 10 o'clock at night, the men came stampeding up the yard stating that No. 2 holder had come down with a rush. He told them to get the hose into the cup to fill it with water; and then he turned the balance of the gas into a lighter holder. Meanwhile they lost a good many thousand cubic feet of gas. In the end they had to pump the water out of the tank and go round the lute; and they found that instead of an ordinary rivet being used in the circle of the cup some person put in a lead rivet, which had been worked out by the friction. But he did not think that any of them could have had quite such an experience as that described by Mr. Tooms. There must have been something at fault to have that timber in the holder, and the ladder being there made the matter look worse.

A Member—I suppose the ladder was left in to take the timber out!

Mr. J. Richmond, Kilkenny, said he saw the timber taken out of the Waterford holder, and it would be interesting if Mr. Tooms could give them particulars of the dimensions of it. It was something extraordinary. Some of the timber would be about 6 inches square and 4 feet long. Mr. Tooms might also explain the methods adopted for wrenching the cups asunder and extracting the timber.

Mr. J. Lyne, Wexford, said he knew something of this holder, and remembered when it was built. He had the honor of being called upon by the Directors of the Company, about the year 1892, to inspect the works and make a report upon them, and, as far as he could remember, up to that time there was no difficulty about the working of this holder. The holder seemed at that time to rise vertically and to go down in the way a well-regulated holder should do. But the tank appeared to be erected on very treacherous ground. It amazed him to find that after going on all right for some 13 years or so it should sink, unless there had been some pumping or something of that kind to affect the foundations. It struck him that the cause of the trouble had not been such as Mr. Tooms appeared to think. There must have been great carelessness, or so many blocks of wood could not have been left—the tank seemed to have been stacked with timber, something like a builders' storehouse. How these things could have been left in the holder without careless supervision he could not imagine. He would like to know something about the rubber tyres of which Mr. Tooms spoke. They were certainly indebted to Mr. Tooms for bringing these matters under their notice.

Mr. G. Cummings, Balleymoney, said there were some things in the paper that might be criticised, but there were such strange things happening to all of them that it was as well to expect nearly anything and everything. As to its being considered strange that this holder should go wrong after working satisfactorily for a time, he had known of a holder working for years and years which had afterwards to be pumped out. In that case the rollers were properly attached to the curb of the tank, and everything appeared to be right.

Mr. T. Frizelle, Holywood, said that in view of Mr. Tooms' statement, that the holder had been at work for a number of years without any difficulty being experienced, was it not possible that some of the workers with whom there had been trouble had put the timber and the ladder in?

Mr. Lyne said he did not think that was possible. Besides, there had been no trouble with the men.

Mr. Frizelle said it would be easy for the men, if they were so disposed, to insert the timber into the tank, and from there it might go into the holder.

Mr. H. Kirkham said he left Waterford in the year 1896 and it was about a year before that that the trouble began with the holder. It was a 3-lift holder. You might look at it and find the bottom lift up 2 sheets, and everything apparently all right, yet almost as soon as your back was turned it would suddenly go down. The holder, indeed, seemed rather a mysterious one. In some cases it was as well to keep your mouth shut and say nothing. But there was no dynamite or anything of that sort about the business at all—what had occurred was purely an accident. Mr. Tooms' account of his efforts to stop the pranks of the holder was interesting.

Mr. J. Richmond said it was a mistake to suppose there was any mystery about the presence of the timber. The timber was left, as the paper said, by the individual who was in charge of the repairs in 1899, and Mr. Tooms was aware of it, but he had no means of removing it except those which he ultimately adopted. The water was allowed to go into the tank in the belief that the timber blocks would float on the surface.

Mr. J. C. Adamson, Airdie, invited to give an explanation of the state of affairs, described by Mr. Tooms, pleaded that he was quite unable to do so. He had been connected with the gas industry for the last half century and had never heard before of an experience such as had been described.

Mr. Kirkham said that before Mr. Tooms replied the meeting might like to hear a narration of his experience with a new holder. They were badly off for storage and they decided to get a new holder. The original holder was a single-lift, in a cast iron tank, which was 9 inches out of plumb. To get the new holder to work plumb there were 5 upright channel irons bolted to the inside of the tank and blocked so as to be perfectly plumb. The channel irons were guides for the new holder, which was a telescopic holder of 2 lifts. For 3 months after its erection it worked splendidly. Then the trouble began. When the bottom lift landed, the pressure would suddenly fall, and then with equal suddenness rise, varying from 15-10ths to 3 inches. Things continued so until the inner lift went down 3 feet. After some correspondence with the makers two men were sent over, and it was found that the uneven working was caused by the upright stays in the bottom of the lift rubbing hard on to the girders of the cup of the inner lift. The mysterious part of the business was that the holder was completely new and worked three months all right, and without any reason whatever the outer lift seemed to contract equally all round, the rubbing on the upright stays being quite even. The men sent over to remedy the defect relieved each stay half an inch, so as to allow the cup easier movement, with the result that the holder had worked evenly ever since. At the time the jumping occurred he had not a governor and it was not nice to contemplate the lights jumping in the town and the consumers complaining, so he brought an old holder into use, which he connected up in such a way as to make it serve the purpose of a governor.

Mr. Lyne said that he would be inclined to think that the cause in Mr. Kirkham's case was similar to that in Mr. Tooms' case—that possibly there was some timber found in the holder and taken out without Mr. Kirkham's knowledge.

Mr. Kirkham said that could not be so. He saw that all the timber blocks were out and had a thorough look round at everything before the water went in. No blocks had been taken out since, and the holder had worked splendidly.

Mr. Tooms, replying on the discussion, said the moral of his paper was that no timber should be left in the tanks. Some managers might think that the timber might be left without risk of getting into the lifts, but the experience he had narrated proved otherwise. In regard to the rubber tyres, as to which a question had been put, they were bracketed on to the grips of the second and third lifts and on to the tank wall to guide the third lift—12 rollers on each lift, working in contact with the holder. That, in conjunction with the counterbalancing of the holder, had undoubtedly put the holder practically right. He had no fear now

that it would uncup. As regards the removal of the timber blocks, some of which were actually 6 inches square, so that they bulged out the grip of the lute plate, when the timber had already got in the grip of, say, the second lift, they had to let the gas go out of the holder until the top lift was only half full. Then they had to depress the plates in the top lift inwards and force the blocks under the lute plate downwards and then up between the lute plate and the plates of the top lift. That was one of the methods employed to get the blocks out. It was not done, of course, without considerable damage to the holder. Mr. Lyne had spoken about the responsibility connected with the blocks being left in. As that happened before he went to Waterford, he had not thought it desirable to rake up the matter at all or to say anything as to who was at fault.

Miscellaneous Notes of Interest to Central Station Men. No IV.

[By Mr. W. H. Wakeman, in *Electricity*.]

Every engineer knows that a tight belt will cause a bearing to heat unless it is well lubricated, but when a belt has been running loose for some time and is then made tight he may not remember to watch the nearest bearing until he knows that it will not heat, unless reminded of the necessity for so doing, and failure to give it due attention at this time may result in causing the babbitt in the boxes to be melted out.

It will do no harm to test the nuts on the foundation bolts of your engine occasionally, in order to be sure that they are not working loose.

I do not advocate the waste of oil or other supplies, but at the same time it pays to provide a plentiful supply for every bearing in a steam plant. This does not mean that large quantities of oil should be poured into every bearing daily, only to run out on the floor, but it does mean that where means are provided for pumping the oil out of a drip pan upon the shaft, after which it falls back into the pan again, the friction is reduced to a minimum, and this means less coal for the furnace and less wear on the boxes. My attention has been called to this subject again by noting that the boxes on a dynamo which has been run for five years show but slight wear, and there is a good chance here to tell just how fast the babbitt does wear. Ring oilers are provided which deliver a constant stream of oil to the bearings whenever the shaft is in motion.

Some ring oilers are much more efficient in delivering oil than others are. If the ring is made heavy enough to be worthy of the name and is in the form of a true circle, it will probably do the work for which it was made, but where a piece of steel wire is bent so as to caricature a circle, sprung over the shaft and allowed to rest on the bottom of the drip pan or oil reservoir, there is a good chance for it to do more harm than good, because it gives the bearing the name of having a ring oiler when in reality it has nothing of the kind.

I notice that several manufacturers of injectors claim to have made many thousands of their boiler feeders, and their statements are probably correct. When the number of injectors made by the smaller concerns is added in, the aggregate must be very large. Some people wonder where all of the pins go to that are made, and following out the same line of thought I wonder where all of the injectors go to. This is a very large country and there are many thousands of boilers in it, so that it requires a very large number of injectors to supply all of them, but I am of the opinion that if all of them that have been made in the last 10 years had been properly taken care of, there would have been a surplus of them somewhere. This might not have suited the firms who make them, but would have pleased those who buy, and incidentally been a source of satisfaction to those who use them.

If an injector is not as reliable as it was when new, it should be filled with a mixture of muriatic acid and water and allowed to stand for 10 or 12 hours. This will remove the scale which has made some of the passages smaller than they ought to be, and will probably make the injector as reliable as it was when new. About three parts of water to one of acid will answer every purpose, as it does not need to be very strong. In some cases this will not cure the trouble, but if it does not there is no necessity for throwing the whole machine away, any more than there is for buying a new engine whenever a part of the old one is broken or worn out. Send it to the makers and get new tubes for your injector which will make a new machine of it.

The girth seams of a tubular boiler will sometimes leak when the scale is removed which stops up all the small crevices, and it may be necessary to have the seams caulked. After this has been done several times the edge of the plate must be chipped off in order to make the caulking effective, but when this fails to keep the seams tight it is time to look for the trouble elsewhere. A defective plate may be responsible for it, or some of the rivets may be worthless, or perhaps the rivet holes do not come "fair," so that the rivets are not given a chance to hold to good advantage.

If there are no defects in the boiler itself there must be some trouble with the management of it. The practice of introducing the feed water through the bottom of the shell causes unequal contraction which will make almost any boiler leak sooner or later. Some plan should be adopted for every boiler whereby the feed water will be discharged into the body of the water already in the boiler, as in this way it becomes well heated before it reaches the plates where it can cause trouble. This rule applies to cases where a good exhaust steam heater is used, as well as where the water is pumped in cold.

A certain engineer, whose plant is run 24 hours per day, has been troubled much by careless men in different rooms who persist in attempts to use more electricity for motors, etc., than his generator was intended to supply. As this generator was badly worn he ordered a new one of twice the capacity of the old, so that now he does not need to caution them about being careful. When they try to use more than is required to do their work in a proper way, the engine slackens its speed and this reduces the tension of the current wherever used. As this is not satisfactory they soon become tired of it and begin to use the current judiciously. I suppose that if the owner of the plant puts in a larger engine, they will find some way to use all of the current available at times, whether it is needed or not.

We are told that when the water in our boilers is evaporated into steam it leaves all of the impurities behind it, but this is not always true, for some of the impurities or the foreign matter will pass out with the steam. I knew of at least one case where the safety valves of a battery of boilers were always leaking, and when examined a thin coat of white scale was found on both valve and seat, which was caused by using soda ash as a boiler compound. All efforts to keep the valves tight were useless, until the use of the boiler compound was discontinued, when the trouble disappeared.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. F. C. Heinen has been elected Secretary and Treasurer of the Milton (Pa.) Gas Company.

Mr. J. Frank Stacey, the clever Superintendent of the Nashville (Tenn.) Gas Light Company, is no longer a bachelor, having, on the 30th of July, taken unto himself a life partner. His wife (who was Miss Grace L. Ranshaw) is the charming daughter of Mr. and Mrs. Thomas C. Ranshaw, of Covington, Ky. The home of the happy pair is at 2110 Hayes street, Nashville.

Messrs. Adam Weber Sons, writing to us under date of the 17th inst., inclose a testimonial from Mr. Axel H. Engstrom, C.E., of Philadelphia, in which that gentleman says: "In accordance with your request of August 14th, to give you a testimonial of the stacks that you had built for me as consulting engineer for the De Laval Steam Turbine Company, and also for the Beaver Valley Traction Company, I would say that both of the stacks were built to my entire satisfaction, that the workmanship was very good, and that the bricks of which you built the stacks were very fine. The stacks have been admired by a number of people, and have been found to do all the work they were specified to do. I shall take pleasure in giving you a chance to bid for all stacks of this description that I may have under my supervision."

The Boston *Traveler* had this to say recently: "The report of Deputy Fire Marshall Rice, of Boston, in the case of the explosion last July, in the house of Mr. James Means, Smith's Point, Manchester, Mass., which was delayed on account of the serious condition of Mr. Means, has been submitted to Fire Marshall Shaw. The explosion, which seriously injured several persons and wrecked the house, was attributed at the time to the explosion of the acetylene gas machine used for lighting the house. 'I find that the identical machine which exploded was in Mr. D. T. Beston's hardware store in Manchester, on December 6 last, and exploded there, causing a fire,' says Deputy Rice in his report. 'I find that Mr. Mean's coachman had charge of the generator, and had charged it two weeks before the explosion. He complained to the family that it was leaking gas, but no notice was given to Mr. Benton. The machine was inspected when put in and pronounced all right by the Company.' Mr. Mean's own statement, as it appears in the Deputy's report, says: 'I proceeded to draw off the water in the machine, and replaced it with fresh water. I then put in the carbide. I had often done this before, and followed the instructions as given for the replenishing of the machine. I noticed that the acetylene gas continued to escape

and there was a gurgling sound emitted. I remained by the machine 20 minutes and was turning to go when the explosion came. My theory is that the gas escaped into the kitchen and was exploded by the kerosene lamp or by the stove.' No final finding has been made in the case as yet, the Fire Marshall preferring to allow Messrs. J. B. Colt & Co., of New York, the manufacturers of the machine, to make some explanation regarding the affair."

HARTINGTON, Neb., is agitating the subject of the establishment of a gas works there, the same to be operated on municipal account.

THE Olds & Hough Gas Engine Works have been removed from Albion, Mich., to Hillsdale, Mich.

GENERAL Manager Mitchell, of the St Joseph (Mo.) Gas Company, is a very busy man just now, overseeing the extension of its mains to and through North and South St. Joseph, to the city limits. It is estimated that an expenditure of $35,000 will be required to complete the extensions mapped out.

IT is understood that work on the proposed gas plant for Nazareth, Pa., which is to be operated under the title of the Nazareth Gas Company, will be commenced this fall.

WORK on the new gas plant at Brookfield, Mo., is underway.

THE transfer books of the Cincinnati Gas and Electric Company were closed on the 27th ult., to be reopened to-morrow, to arrange for the exchange of the old stock certificates for the new ones.

THE proprietors of the Wauwatosa (Wis.) Gas Company, in order to induce the houseowners of that city to have their premises piped for gas, have offered the following advantageous terms, which will be unavailable after November 1st:

"1. The Gas Company will equip all the rooms of a house, including bathrooms and halls, without charge, providing the owner will buy a complete set of fixtures for all the openings in the house and begin to use gas by November 1, 1901. Otherwise the cost of piping will be at the rate of $2 per room.

"2. The Gas Company will run a separate pipe for fuel from the meter to the range free of charge, providing the owner buys a range and has it connected before November 1, 1901.

"3. The Gas Company will carry a line of gas and combination fixtures at its office. and will sell them at the lowest prevailing prices. Two kinds of gas ranges will be carried in stock, the Detroit Jewel and the New Process. and these ranges will be sold at $12 for the syle having the 16-inch oven and $14 for the 18-inch oven. Welsbach burners of the standard styles will be sold at the Company's office at cost price."

THE authorities of Elizabeth, N. J., have entered into a contract with the Elizabethtown Gas Company for the public lighting of that place, in so far as that lighting is performed by gas, for a period of 5 years. Under the agreement the Company is to maintain not less than 900 lamps, fitted with open flame burners, of 5 cubic feet per hour each, at a rate not to exceed $15 per lamp per annum, and 50 single burner Welsbach lamps, at the rate of $23 each per annum.

A MEETING of the shareholders of the United Gas, Electric Light and Fuel Company, of Sandy Hill, N. Y., is called for the 12th inst. The main object of the meeting is to consider a proposition to increase the capital stock from $150,000 to $200,000.

WE understand that a new gas plant is to be constructed at Mount Carmel, Pa., and that the plans indicate that an expenditure of $50,000 will be necessary to complete it. The officers of the Company are: President, John E. Bastrass; Vice-President, L. S. Walter; Treasurer, Wm. S. Thirlwell; Secretary, John P. Helfenstein.

A CORRESPONDENT writes that the Saginaw City (Mich.) Gas Company has accepted a proposition made by a prominent local builder to construct for it a handsome office building on the northwest corner of Washington and Germania avenues.

THERE is some talk of establishing a gas plant in Orange, Mass., the service of the local elecric lighting company being very poor.

THE Board of Gas and Electric Light Commissioners, of Massachusetts, will give a hearing on the petition of the Waltham Gas Light Company to increase its capital stock in the sum of $75,000, at the State House, Boston, the morning of the 6th inst.

THE "Dollar Gas Company," to do business in Burlington, N. J., has been incorporated with a capitalization of $40,000. The main party in interest is Heber C. Robinson, of Camden, according to the returns made to the Secretary of State. The likely power behind the oddly-named Company, though, is the South Jersey Gas, Electric and Traction Company.

IT is said that the percentage gain, made by the Peoples Gas Light and Coke Company of Chicago, in output during July and August exceeded any figure yet recorded in its history.

WE regret to have to chronicle the sudden death of Mr. James McIlhenny, the second son of Mr. John McIlhenny, of the well-known firm of Helme & McIlhenny, of Philadelphia. Mr. McIlhenny's death occurred while sailing from Southern California to Seattle, Wash., on a trip for recreation and the betterment of his health.

CERTAIN business men of Fremont, Ohio, have applied to the City Council for an ordinance permitting them to operate there plants for the supply of gas, electric currents and steam and hot water heating. They declare their action is caused by the excessive rates charged for gas and electric lighting service in Fremont since the combination of the theretofore independent gas and electric companies.

MR. HANFORD S. WEED has been appointed Manager of the Citizens Gas Company, of Bridgeport, Conn.

THE proposition to tax the gas mains of the Indianapolis (Ind.) Company, which was defeated a year ago, has been renewed in the Common Council of that city. The tax named is 2 cents per foot.

A CORRESPONDENT forwards the following, from a recent issue of the Springfield (Mass.) *Republican*:

"The Springfield Gas Light Company will reduce the price of gas from $1.05 to $1 net per 1,000 feet on January 1, next, if, indeed, the reduction is not made November 15, at the close of the present quarter. The management of the Company is also guaranteeing a dividend of 10 per cent. to those buying the small amount of stock that is at present in the market. During the past few days Thompson, Tenney & Crawford, who secured a controlling interest in the Company last spring, have secured 1,500 shares of the stock held by the minority, for which they paid $200 a share. Most of this stock has already been sold at 210, and with it has gone the guarantee that a dividend of 10 per cent. will be paid. The Company, under the old management, paid but 6 per cent. dividends, but the new management, as soon as affairs were running smoothly, increased the dividend to 8 per cent. It is now expected that an extra dividend amounting to 2 per cent. more will be declared at the end of the present fiscal year.

"The management of the Company has had the matter of further reducing the price of gas under consideration for some time, and, it is understood, laid the proposition before the State Board of Gas and Electric Light Commissioners. The Commissioners, it is stated, were dumbfounded at the proposition, and seemed unable to understand just how the reduction was going to be brought about. It was explained that there had been large savings on contracts for supplies, and that the general improvement of the business was responsible. It was planned to make the reduction in November, but the Commissioners asked the management to wait until January 1 before taking the step. It is expected that the price of available stock will advance above 210, as there is only a small amount that can be obtained at any price. When Thompson, Tenney & Crawford bought a controlling interest, those shares, amounting to some 2,700 or 2,800, were pooled for five years, and, of course, cannot be placed on the market until the expiration of that period. This leaves only the comparatively small amount bought from the minority stockholders that they may choose to put upon the market to be secured. This limited supply, coupled with the inducement of a 10 per cent, dividend, will undoubtedly enhance the value. The Company shows that the net receipts this year will be some $81,000, and as $50,000 will pay a 10 per cent. dividend there will still be a surplus.

"That the business of the Company has been steadily increasing during the past years, and at a remarkable rate during the past 8 years, is shown from the following figures, taken from the Commissioner's reports:

	1894.	1901.
Sales of gas	90,000,000 feet.	172,000,000 feet.
Customers	3,400	9,000
Price	1.40	1.05-1
Miles of pipe	40	90
Capacity of plant daily	350,000 feet.	1,500,000 feet.
Capital	$500,000	$500,000
Debt	25,000	None
Cash on hand	10,000	$100,000
Net profits	60,000	81,000

The rivalry between the Gas Company and the electric light company is shown in the fact that in 1894 the gross receipts of the electric light company were 15 per cent. in excess of those of the Gas Company, and last year the former led by only 1½ per cent. The receipts were as follows:

	1894.	1900.
Electric light company	$167,000	$219,000
Gas Company	143,000	216,000

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
MANAGER.

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New York—American News Co. 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, SEPTEMBER 2, 1901.

The Market for Gas Securities.

There was heavy trading in Consolidated gas this week, most of the transactions having been made at prices quite well in advance of any quotation recorded for several months. The high mark with dividend on was in excess of 229, and to-day (Friday) the shares sold shortly before the close at 226¾ ex-dividend of 2 per cent., payable the 16th inst. Rumors as to what is about to be done are plenty, but the main cause for the advance may be the tremendous earnings of the corporation. The arrangements for the construction of the mammoth plant at Astoria are going on steadily.

Brooklyn Union shows no particular change and the actual dealings in it are few and far between. Its local champions are beginning to assert unreservedly that no combination of its interests will be made with those of Consolidated, and they urge as the reason for such stand that the Company is amply able to take care of itself, even in the event that it shall have to make large expenditures on construction account. Of course, the Brooklyn Union Company is in every respect independent of and, but nevertheless it looks to us inevitable that amalgamation is to occur, simply because it is in line with commonsense. The general market for gas securities is steady, with a pronounced inquiry for bonds of anything like fair standing. An exception to the ruling strength is shown in Laclede common, and Baltimore Consolidated is also a trifle lower.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

SEPTEMBER 2.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	226½	227½
Central Union, Bonds, 5's.	3,000,000	1,000	109	110
Equitable Bonds, 6's	1,000,000	1,000	105	
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	305	315
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	
New Amsterdam Gas Co.. Bonds, 5's	11,000,000	1,000	107½	108
Northern Union, Bonds, 5's.	1,250,000	1,000	106	108
New York and East River . Bonds 1st 5's	3,500,000	1,000	111	115
' 1st Con. 5's	1,500,000		109	111
Richmond Co., S. I.	348,650	50	100	..
" Bonds	100,000	1,000	103	..
Standard	5,000,000	100	135	..
Preferred	5,000,000	100	153	..
Bonds, 1st Mortgage, 5's	1,500,000	1,000	118	..
Yonkers	299,650	500	130	
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	216	217
" " Bonds (5's)	15 000,000	1,000	118	119
Bay State	50,000,000	50	..	1
" Income Bonds	2,000,000	1,000	.	75
Binghamton Gas Works..	450,000	100	30	40
" 1st Mtg. 5's	509,000	1,000	92½	95
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	6	8
" " Bonds, 5's	5,250,000	1,000	69	72
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000		
Central San Francisco	2,000,000	..	106	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas & Elec. Co.	29,500,000	100	104½	104¾
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	106	107
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	60	65
Preferred	3,026,500	100	84	86
Consumers, Jersey City Bonds	600,000	1,000	102	103
Consumers, Toronto	1,700,000	50	215	216
Consolidated, Baltimore	11,000,000	100	64¾	65½
Mortgage, 6's	3,600,000	..	..	115
Chesapeake, 1st 6's.	1,000,000	..	..	..
Equitable, 1st 6's.	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	12	14
" Con. Mtg. 5's	380,000	1,000	81½	83
Consolidated G. & E. Co.'s., Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co.	4,825,500	50		89
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	381,000	1,000	89	89½
" Inc. 5's	16,000	100	94	94½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	34	38
Fort Wayne	2,000,000	..	..	.
" Bonds	2,000,000	..	54	58
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	102	104
Hartford	750,000	25	240	250
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	50	60
" Bonds, 6's	2 650,000	..	99½	101
Jackson Gas Co.	250,000	50	65	70
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	90	93
Preferred	2,500,000	100	101	102
Bonds	10,000,000	1,000	..	108½
Lafayette Gas Co., Ind.	1,000,000	100		60
Bonds	1,000,000	1,000	48	55
Louisville	2,570,000	50	110	120
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	102½	108
" 6 per cent. scrip, due 1910	100,000	25	87	89
Montreal, Canada	2,000,000	100	182	184¾
Newark, N. J., Con. Gas Co	6,000,000	..	..	55
Bonds, 6's	4,600,000	..	..	103
New Haven	1,000,000	25	290	325
Nashville Gas Lt. Co.	1,000,000	50	110	..
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	112¾	113
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	46	46½
St. Paul Gas Light Co.	1,500,000	100	60	63
1st Mortgage 6's.	650,000	1,000	82	85
Extension, 6's	600,000	1,000	..	..
General Mortgage, 5's	2,465,000	1,000	88	90½
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	93	96
Syracuse, N. Y.	1,750,000	100	17	19
Bonds	1,612 000	1,000	91	93
Washington, D. C	2,600,000	20	298	300
First mortgage 6's	600,000	..	..	..
Western, Milwaukee. Bonds, 5's	4,000,000	..	106	108
Wilmington, Del.	600,000	50	210	215

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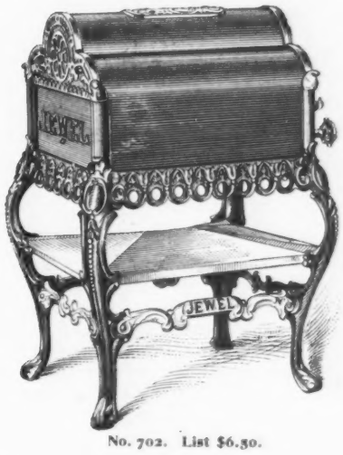

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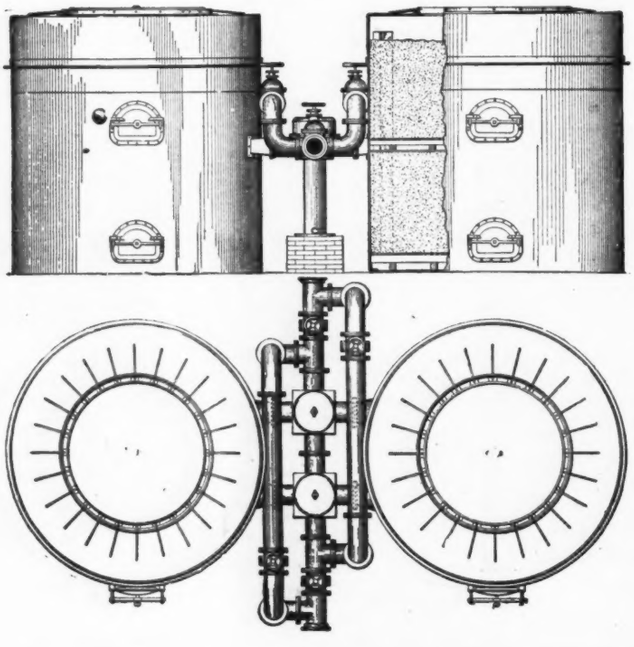

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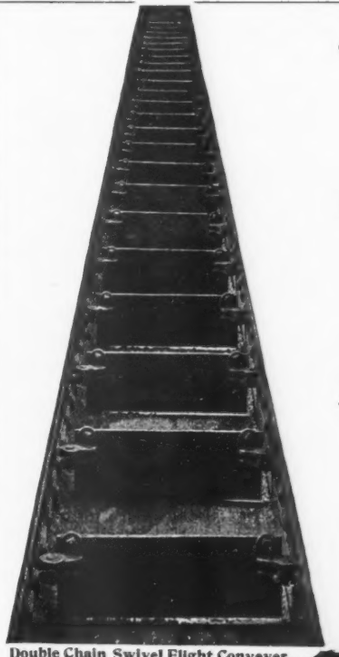

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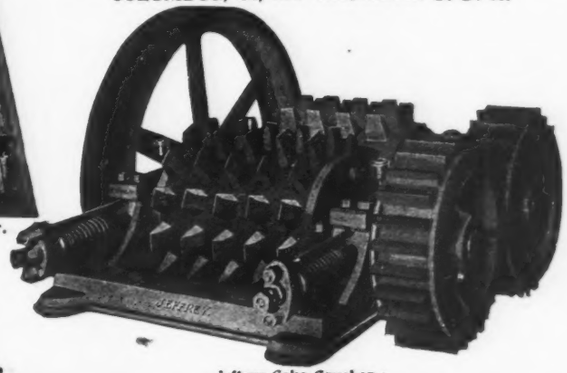

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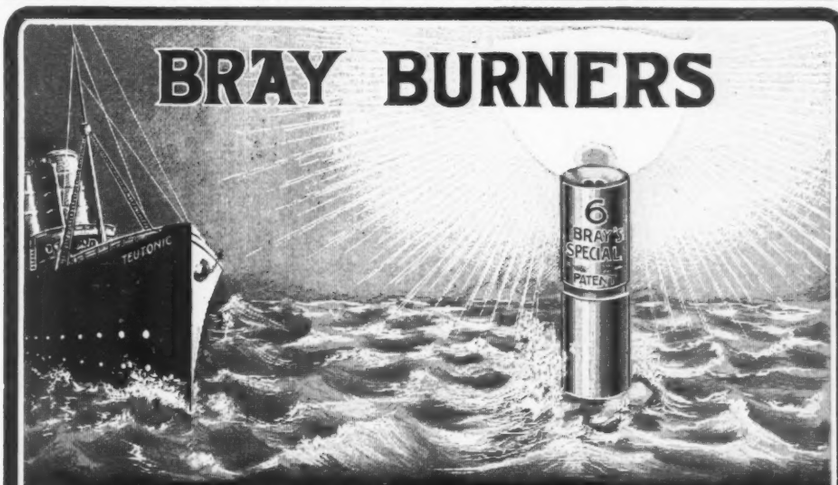

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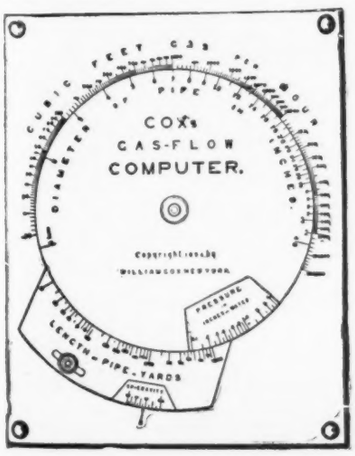

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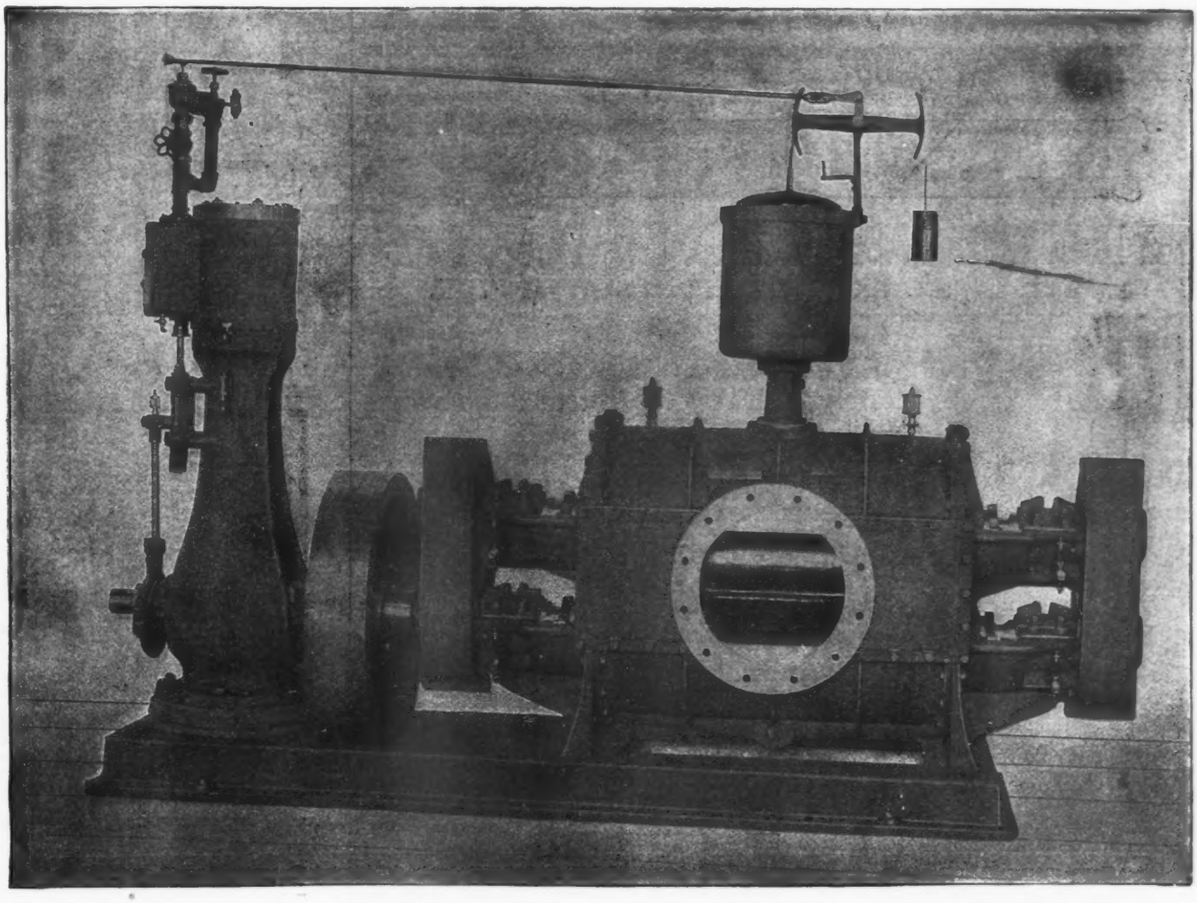

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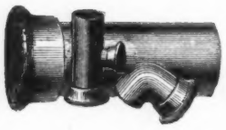

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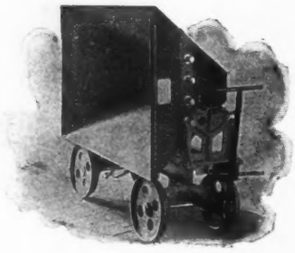

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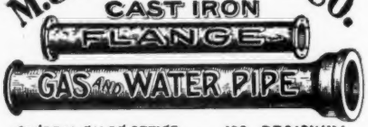

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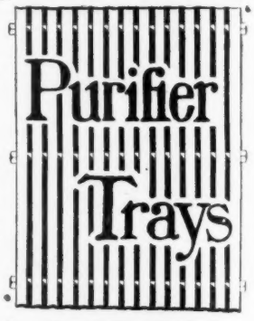

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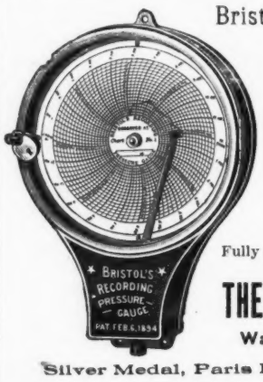

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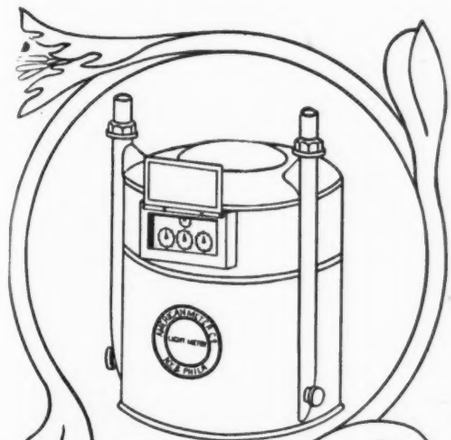

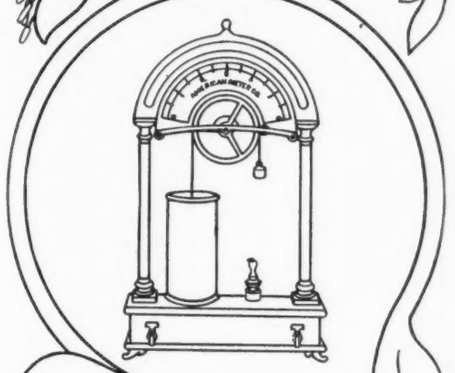

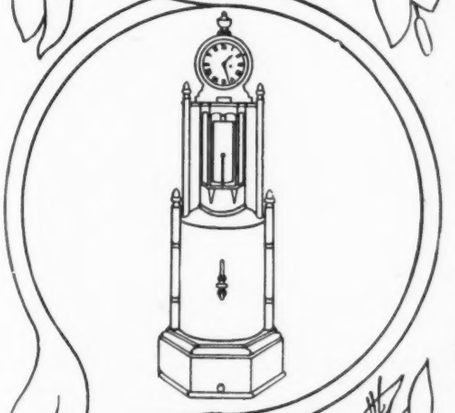

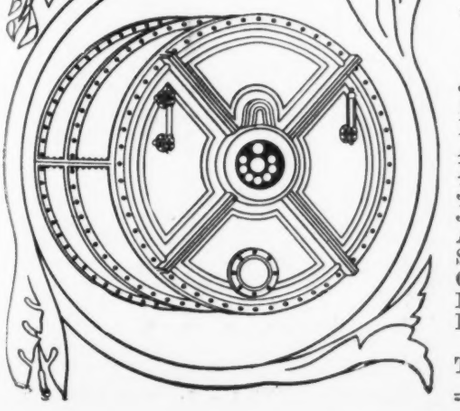

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NEW YORK AND PHILADELPHIA,

CHICAGO, ST. LOUIS,

SAN FRANCISCO.

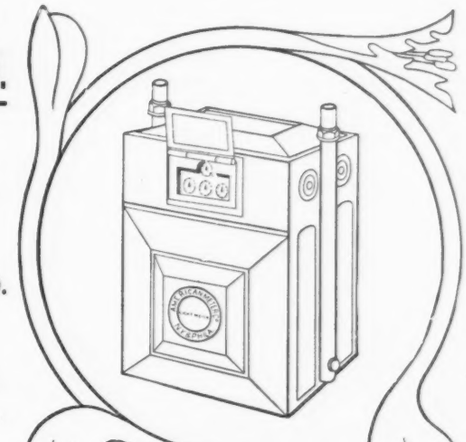
PUBLIC LIGHTING TABLE.

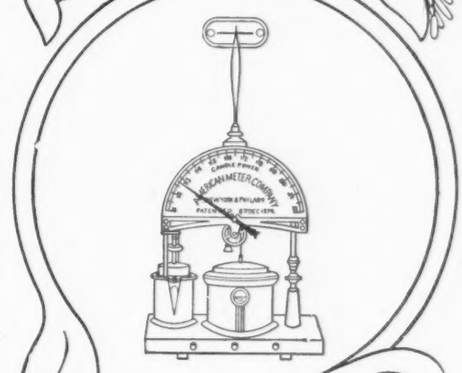
SEPTEMBER, 1901.

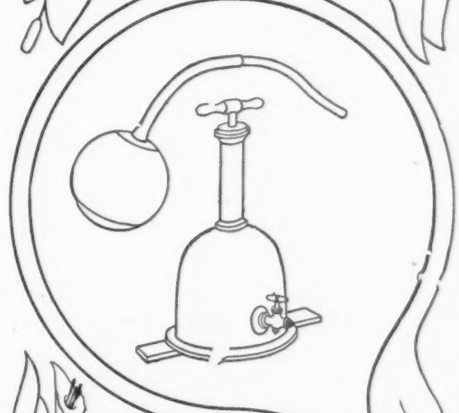
Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Sun.	1	7.00 PM	9.00 PM	6.30	4.20
Mon.	2	7.00	9.40	6.30	4.20
Tue.	3	7.00	10.20	6.15	4.30
Wed.	4	7.00	11.10	6.15	4.30
Thu.	5	7.00 LQ	12.10 AM	6.15	4.30
Fri.	6	7.00	1.10	6.15	4.30
Sat.	7	7.00	2.10	6.15	4.30
Sun.	8	6.50	3.20	6.15	4.30
Mon.	9	6.50	4.40	6.15	4.30
Tue.	10	6.50	4.40	6.05	4.40
Wed.	11	6.50	4.40	6.05	4.40
Thu.	12	6.50 NM	4.40	6.05	4.40
Fri.	13	6.50	4.40	6.05	4.40
Sat.	14	6.50	4.40	6.05	4.40
Sun.	15	6.40	4.40	6.05	4.40
Mon.	16	6.40	4.40	6.05	4.40
Tue.	17	7.30	4.40	5.55	4.50
Wed.	18	8.10	4.40	5.55	4.50
Thu.	19	8.50	4.40	5.55	4.50
Fri.	20	9 40 FQ	4.40	5.55	4.50
Sat.	21	10.40	4.40	5.55	4.50
Sun.	22	11.40	4.50	5.55	4.50
Mon.	23	12.40 AM	4.50	5.55	4.50
Tue.	24	1.50	4.50	5.40	5.00
Wed.	25	2.50	4.50	5.40	5.00
Thu.	26	No L.	No L.	5.40	5.00
Fri.	27	No L. FM	No L.	5.40	5.00
Sat.	28	No L.	No L.	5.40	5.00
Sun.	29	6.10 PM	7.40 PM	5.40	5.00
Mon.	30	6.10	8.20	5.40	5.00

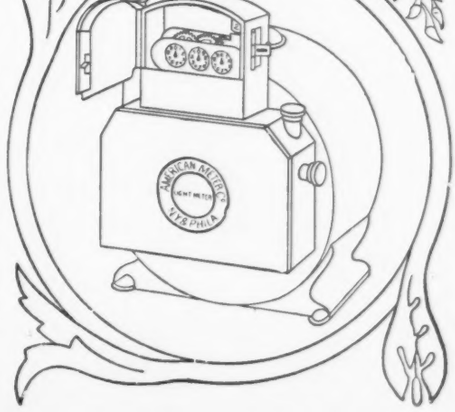
TOTAL HOURS LIGHTING DURING 1901.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	220.10	January	423.20
February	192.30	February	355.25
March	180.00	March	355.35
April	158.30	April	298.50
May	140.40	May	264.50
June	135.40	June	234.25
July	138.00	July	243.45
August	156.20	August	280.35
September	174.40	September	321.15
October	202.30	October	374.30
November	220.40	November	401.40
December	241.30	December	433.45
Total, yr.	2161.10	Total, yr.	3987.45









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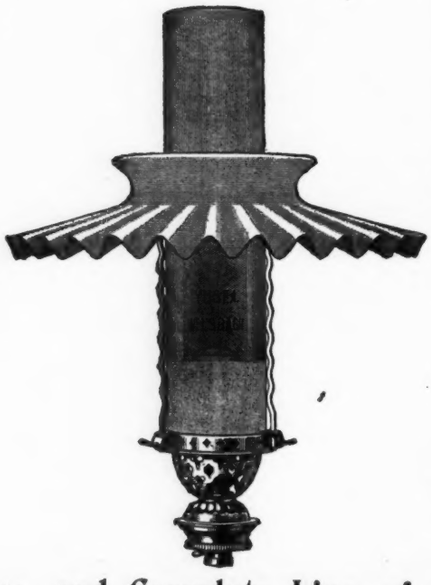

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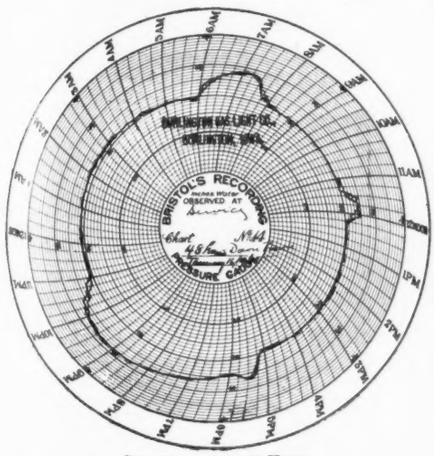

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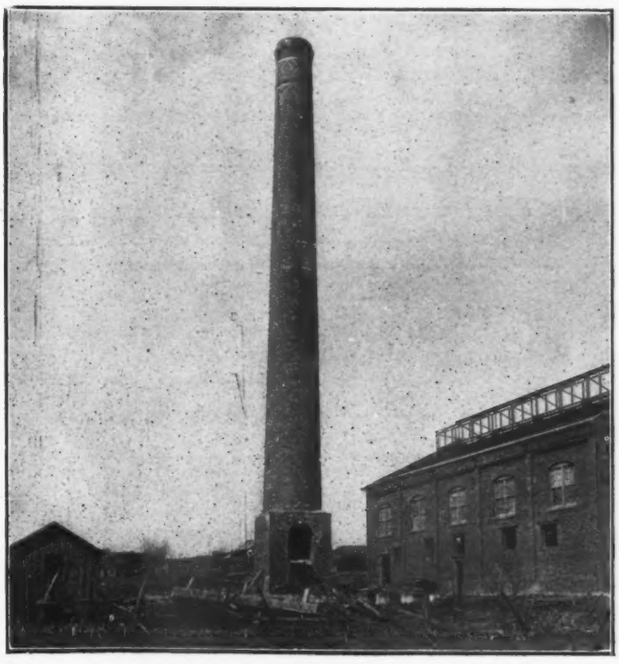

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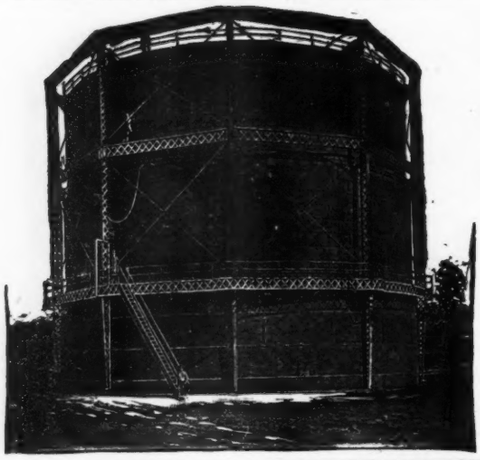

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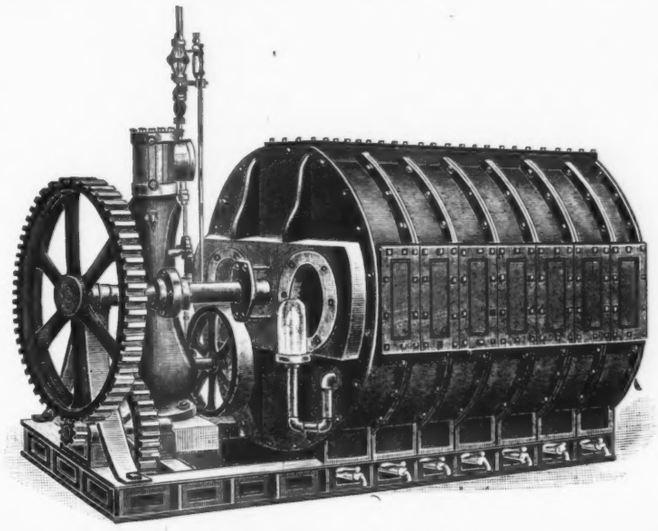

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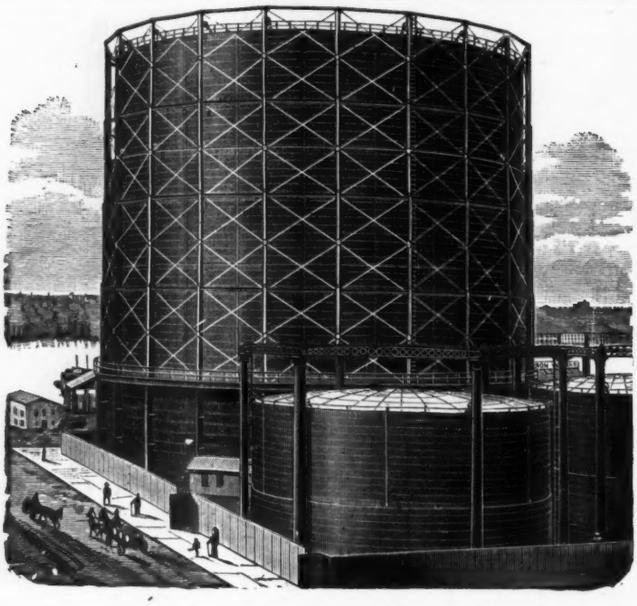

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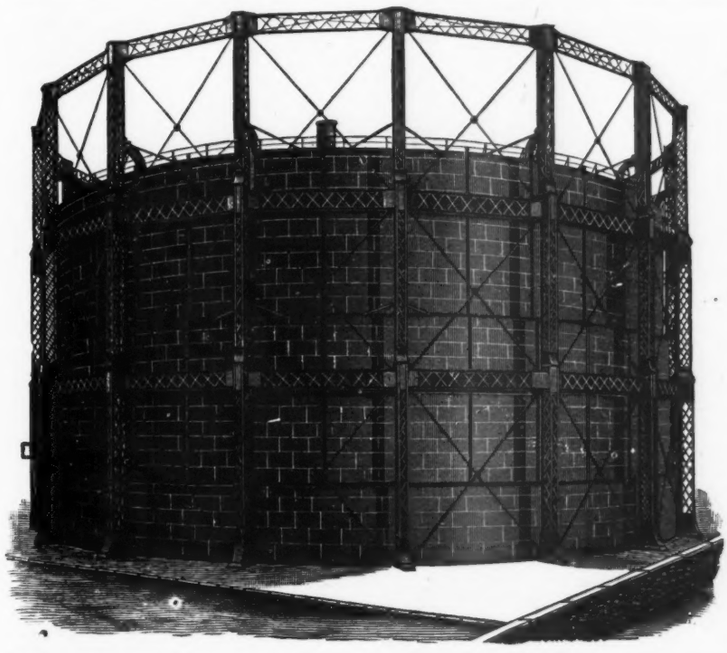

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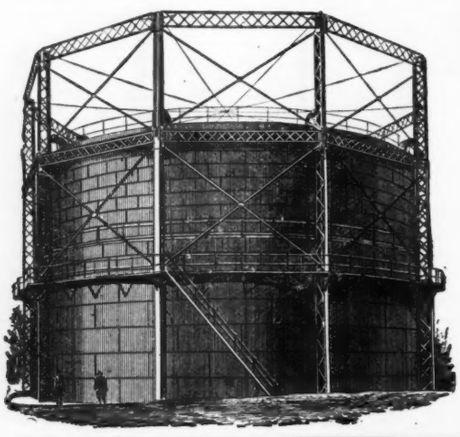

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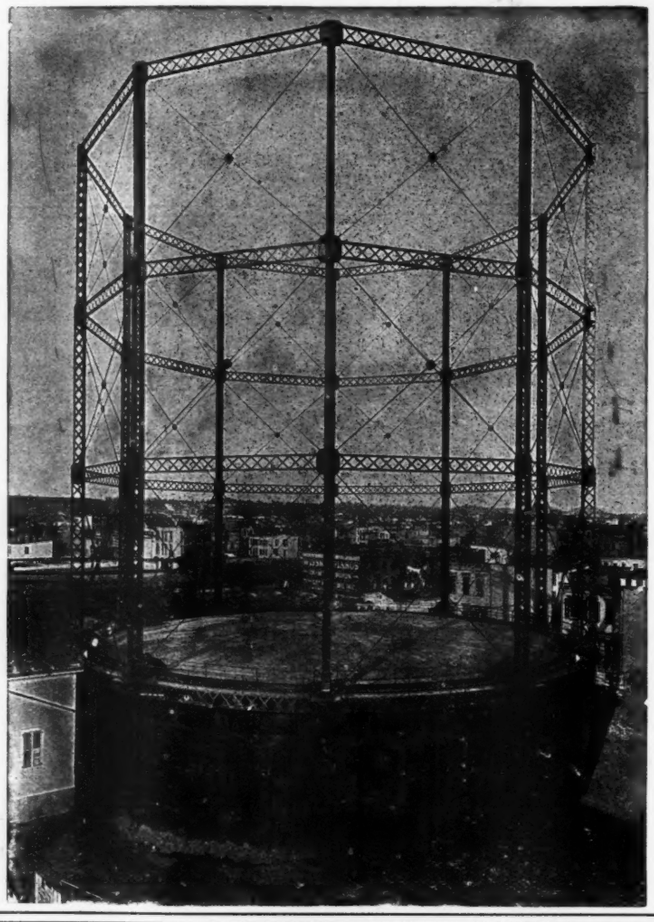

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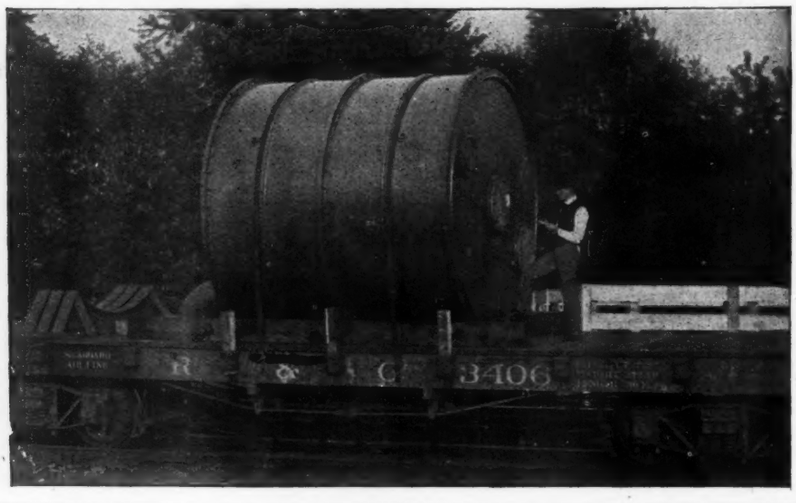

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